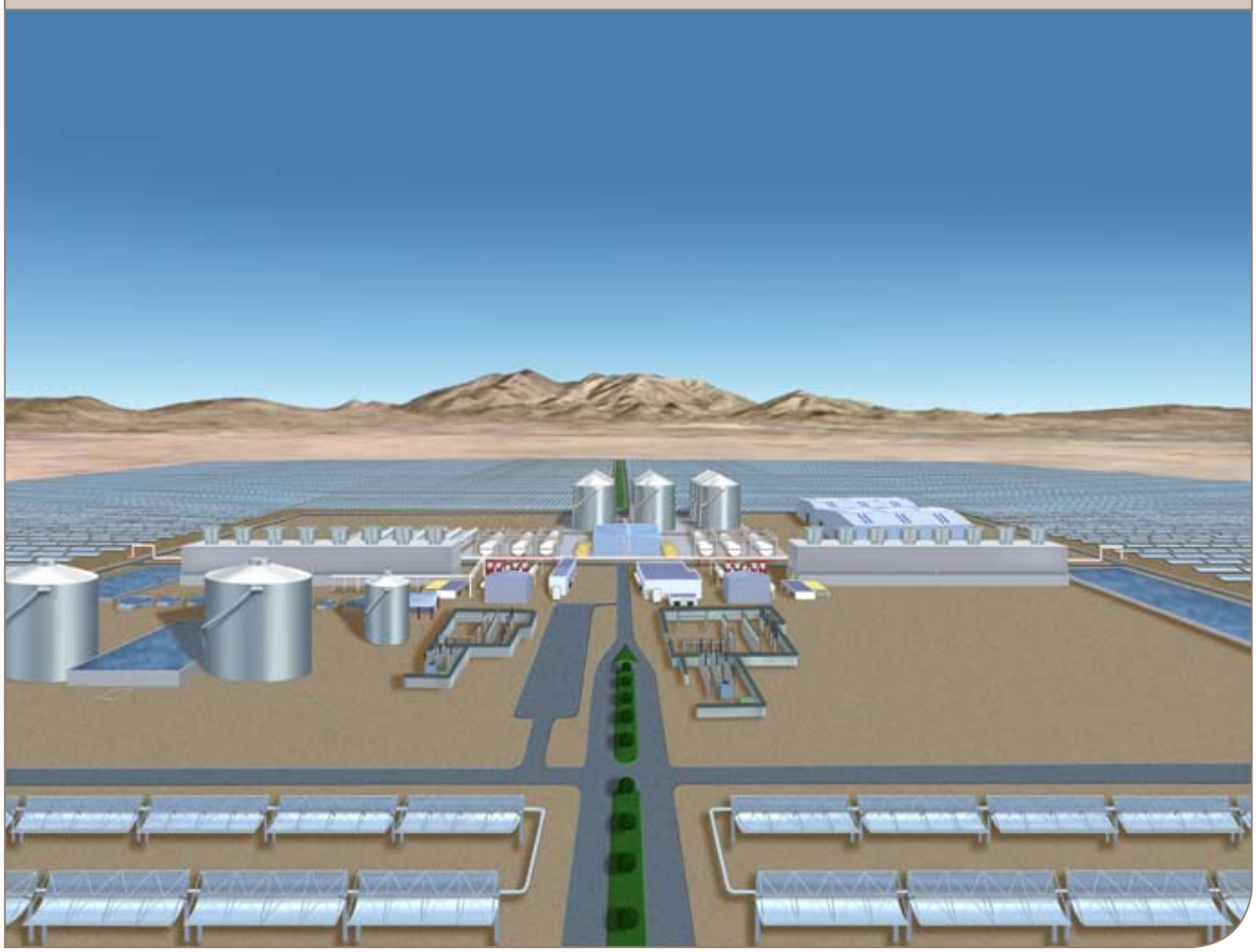
Ullage systems in solar power plants



Solar energy

Globally, we search for alternative energy sources to combat climate change and assure a sustainable environment.

The total solar energy absorbed by Earth's atmosphere, oceans and land masses is approximately 3,850,000 exajoules (EJ) per year. This is more energy in one hour than the world uses in one year. The amount of solar energy reaching the surface of the planet is so vast that in one year it is about twice as much as will ever be obtained from all of the Earth's non-renewable resources of coal, oil, natural gas, and mined uranium combined.

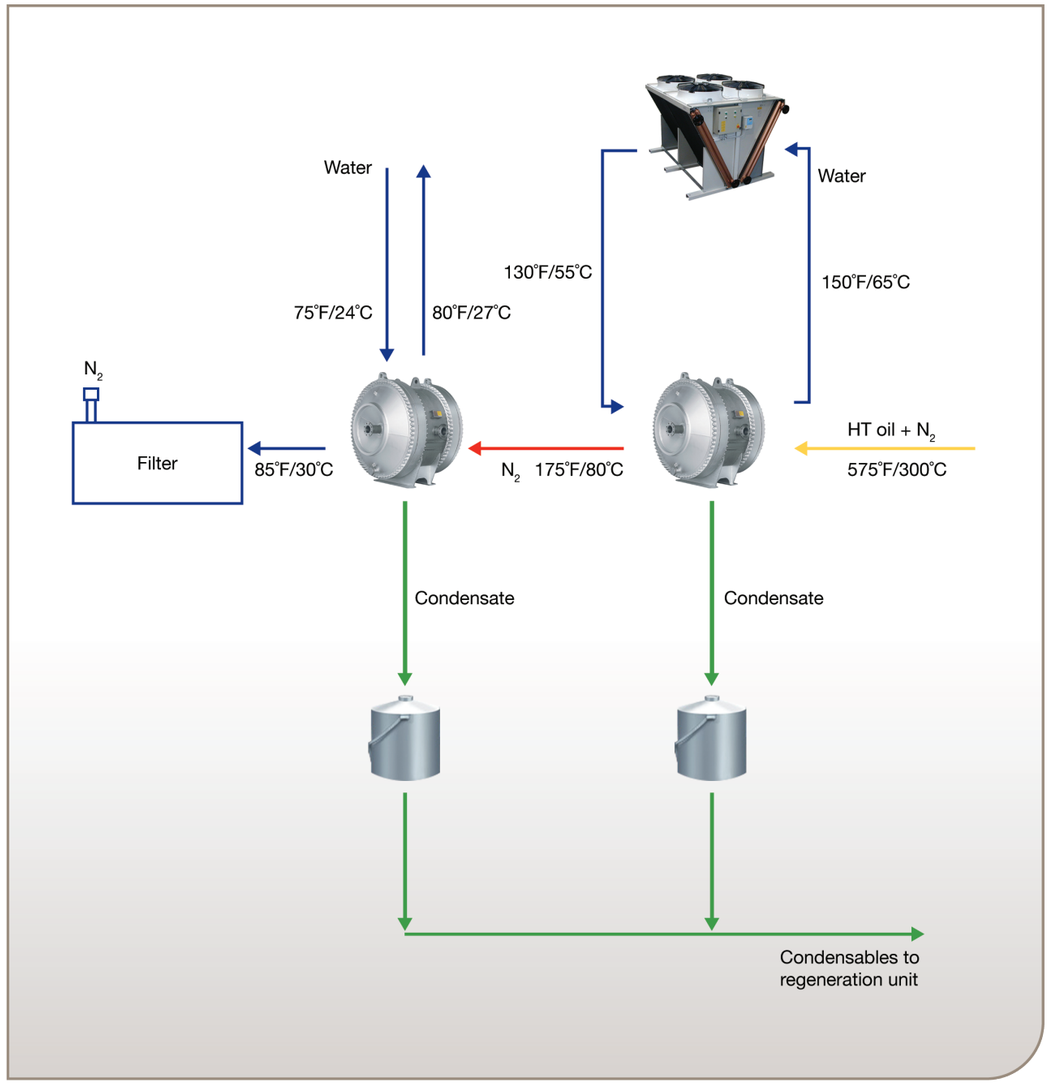
Ullage system in the solar process

At Alfa Laval, we are committed to supplying heat transfer, dry cooling and separation solutions for processes in place to help solve the global challenge for alternative energy sources. One of these processes is the Ullage process for solar energy.

Our solution combines hot oil condensing with dry cooling in one durable, flexible package to use in your Ullage system for Heat Transfer Fluids (HTF). Our extensive heat exchanger and separator range has been installed in power plants worldwide for over fifty years.

As environmental impact is a high priority for any power plant, Alfa Laval is committed to offering solutions that provide you with a way to exceed regulation. In addition, your plant will realize optimal uptime, cost and energy efficiencies.

Ullage System

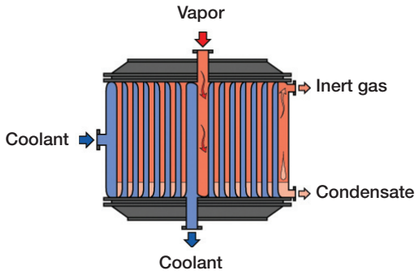


Process description

In the above diagram, Heat Transfer Fluid degradation gases are removed from the HTF expansion vessel. These hot gases enter the first Alfa Laval Spiral Heat Exchanger (SHE) and are condensed and cooled. The fluid condensed is collected in a tank and then returned to the HTF Regeneration Unit. The cooling water supply for the condenser is set up in a closed loop system. This closed water loop is cooled by an Alfa Laval Dry Cooler thus minimizing the need for cooling tower water used in the second stage.

The gases not condensed in the first SHE enter into a second SHE and are condensed and cooled further using cooling tower water. The fluid condensed is collected in a tank and also returned to the HTF Regeneration Unit.

Alfa Laval Equipment in Ullage System



Spiral Heat Exchanger

Spiral Heat Exchangers

Unique shape has unique properties.

The ultimate problem solver, the Spiral Heat Exchanger (SHE) has a single-channel arrangement that makes it self-cleaning and uniquely able to handle highly fouling fluids. Easy accessibility for maintenance reduces its operating costs and increases plant uptime even further. The unit's flexible design also makes it an outstanding condenser that utilizes the lowest possible pressure drop. Moreover, the SHE condenser can be top-mounted, which significantly reduces installation costs and space.

SHEs are specifically designed for applications characterized by a high degree of fouling as the high turbulence virtually eliminates fouling.

Maximize uptime: Low pressure drop

In demanding processes, Alfa Laval's SHEs are a good solution for many reasons. Their compact design delivers the height in heat transfer efficiency with low pressure drop due to a short flow path and large cross-sectional flow area. This is especially important in condensing duties such as those found in the Ullage system.

Easy installation

The flexible design of the SHE makes installation easy. Installation may be vertical or horizontal. The SHE is flanged at the top for even greater installation flexibility.

Fast, infrequent cleaning

Hydroblasting is typically all it takes to clean an SHE. No time-consuming drilling is required to open up clogged tubes.

SHEs are considerably easier to open and access for cleaning purposes. Their compact design requires minimal extra floor space for opening. Due to the high turbulent flow, the need for cleaning is infrequent.

The bottom line: cleaning an SHE is 4-10 times faster than cleaning a shell-and-tube.

Dry Coolers

Dry Coolers are suitable for closed-loop cooling of various process liquids. The Alfa Laval Dry Cooler range is especially suitable for high capacities while still resulting in low energy consumption.

Cooling, availability and quality

Most solar sites have water restrictions - and/or limited to no availability of water.

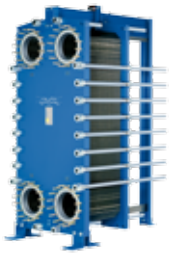
Easily operated and maintained, Alfa Laval Dry Coolers are the first choice in solving water availability challenges for your cooling systems.

- No water consumption
- Quick delivery and assembly
- Factory tested
- Cost and space efficient

Equipped with high efficiency motors resulting in 30% power savings over standard motors.

Dry Coolers equipped with Electronically Commutated (EC) motors.

Global installations in plants for over 50 years



Gasketed and Semi-Welded Heat Exchangers

Alfa Laval's gasketed heat exchangers meet basic operational needs. A full portfolio with a wide range of shapes and sizes makes it possible to tailor a solution for each given duty, and the design can be adjusted to fit new conditions simply by removing or adding plates to the plate pack. Furthermore, the ease of dismantling and cleaning makes them highly serviceable. The semi-welded concept is designed to handle aggressive media on one side.

Compabloc

All-welded yet fully accessible, the Compabloc offers the possibility to handle tough duties involving high pressures and temperatures as well as aggressive media – without compromising fast and easy cleaning and inspection. Flexible connection sizes and placements allow dissimilar flows, and combine with the short plate construction to make the Compabloc an excellent choice for condensing and reboiling duties.

Packinox

The cutting edge technology of Alfa Laval Packinox heat exchangers ensures optimum performance and reliability in even the most demanding operating conditions. In 1980, Alfa Laval Packinox made the breakthrough which successfully combines the high temperature, high pressure performance of shell-and-tubes with the thermal and hydraulic efficiency of plate technology in a compact, large capacity design.

Because Alfa Laval Packinox exchangers withstand extreme temperatures at high pressure, they are suited to a variety of services.

Alfa Disc

The all-welded AlfaDisc is ideal for duties involving high pressures and temperatures, as well as for steam applications. Its cylindrical shape makes the unit capable of withstanding very high pressures, and the accordion-like plate pack makes it less sensitive to thermal expansion. Furthermore, with its flexible connection sizes, the AlfaDisc is an excellent choice for duties involving dissimilar flows.

ALF filter and strainer

For automatic removal of larger debris and particles from the flow prior to entering plate heat exchangers. Also ideal for sifting seawater before sending it into cooling-water coolers.

High Speed Separators (HSS)

Much of the world's energy from diesel, turbine and nuclear power stations is generated with the help of High Speed Separators.

Alfa Laval separators are able to separate and purify widely ranging mixtures of oil, water and solids.

Their compact size and easy installation make them a good solution for any plant. Operation and maintenance is streamlined through easily operated control systems.

Decanters

Reduce the environmental impact from power plants still further with decanter centrifuges for cleaning up waste water streams plus equipment for making the CO_2 capture process even more efficient.

Desalination units

Cost-effective desalination units that employ waste energy or low-cost thermal energy to convert sea water into high-purity fresh water with a low dissolved solids content to provide the fresh water needed to produce both process and potable water. This is done via vacuum distillation using plate heat exchangers with corrosion-resistant titanium evaporation plates, or – if electricity is the only energy available – mechanically driven vacuum vapor compression – involving much less attention and maintenance than the reverse osmosis set-ups traditionally used for desalination.

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