



Many companies that process biofuels are looking into ways of replacing high-cost raw materials with alternative low-cost feedstocks.

It is now possible to turn animal fats, used cooking oils and low-quality raw materials into biofuel, using a straightforward, cost-effective process that employs flash vacuum deacidification technology.

#### 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, foodstuffs, starch and pharmaceuticals.

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

#### 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](http://www.alfalaval.com)



## The flash deacidification opportunity

### Deacidification of high-FFA fats and oils for biofuel production



# More than the sum of its parts



## Combined advantage

Alfa Laval has combined a series of tried-and-tested processing technologies and equipment into a unique configuration, in order to undertake the flash vacuum deacidification of low-quality oils and fats.

The Alfa Laval flash deacidification system is able to process a wide range of different kinds of triglyceride oils and fats with a free fatty acid (FFA) content of up to 50%, providing an output in which the residual FFA content is approximately 1%, depending on specific operating conditions.

This unique Alfa Laval technology set-up is easily scalable and can provide a wide range of processing capacities.

This makes it ideal for companies that already operate in this field on a large scale, as well as for

smaller-scale start-ups. It also provides important commercial opportunities for companies interested in launching into the biofuel market as a new product line.

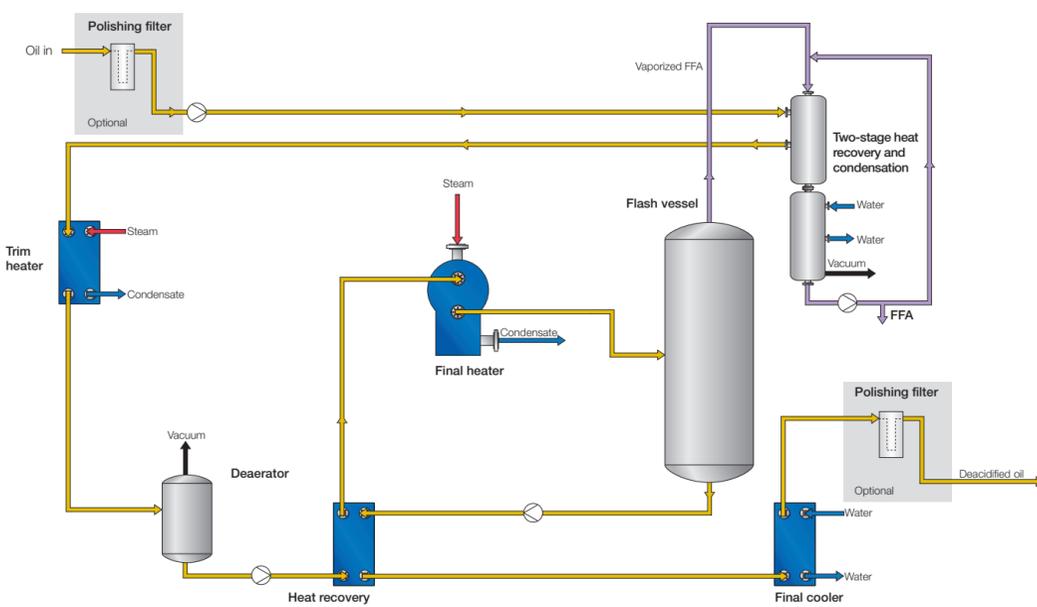
Compared to the traditional deacidification process, which employs stripping gas or steam, an Alfa Laval flash vacuum system requires less energy and involves lower utilities consumption and less capital investment, as well as lower installation and operating costs.

At the same time, it provides much greater operating flexibility with respect to the nature and quality of the feedstock.

## Why use flash deacidification?

- Can use many different kinds of feedstock (animal fats, used oils, low-grade crude oils, etc.)
- Suitable for feedstocks with high levels of FFA (up to 50%)
- Provides a high-purity FFA by-product with good commercial potential
- Provides high-value deacidified oil with a very low FFA content (typically 1%)
- Straightforward yet highly versatile system that can be installed at virtually any site
- Lower utilities consumption
- High heat recovery
- Lower capital investment
- Lower operating costs
- Flexibility regarding use of different utilities.

## Typical flow diagram for flash deacidification system



### Deaeration

The feed oil is transferred through heat exchanger(s) into a deaerator, where dissolved air and moisture are removed under moderate vacuum.

### Heat recovery

Heating to deaeration temperature is carried out by an oil/condensate economizer and a trim heater. The trim heater provides heat during the start-up procedure, when there is no heat available from the economizer, in order to ensure proper deaeration. The trim

heater also provides additional heating if the FFA content of the feedstock is low and the heat recovered from condensation is insufficient to reach the required deaeration temperature.

### Optimized final heating

The deaerated oil is then heated to flashing temperature by an oil/oil economizer and a final heater, before entering a special flash vessel. This final heating can be done by direct electrical heating, high-pressure steam or using thermal oil.

### Flashing

The required flashing temperature depends on the specific FFA levels in the intake flow, the desired residual FFA content and the vacuum level. The feedstock is heated for a short time and flashing takes place immediately hereafter. This limits the time the feed is exposed to high temperature to less than one minute, thus improving the quality of the treated product.



Spiral condenser

### Heat recovery and final cooling

Once flashed, the oil – which is still hot – is transferred through an oil/oil economizer, recovering the thermal energy. Then the oil continues to a water-operated final cooler and into the storage tank. Any solid impurities can be removed from the oil using a polishing filter module.

### FFA condensation with heat recovery

The fatty matter vapours enter a two-stage condensing system, consisting of the economizer and a water-operated trim cooler. The economizer alone provides full condensing and sub-cooling of the fatty matter distillate, while the trim cooler adjusts the outlet temperature to the desired level, independently of the feed temperature. It also takes over during shut down.

## Vacuum system much smaller

Because the stripping steam used in traditional systems is not needed, the vacuum load is reduced by 90%. Several alternative vacuum systems can be supplied, depending on the utilities available on site.

## Capacities and utilities requirements

A range of different capacities and installation layouts are available, making it possible to fit the equipment into any appropriate space in the best possible way. For small processing capacities, containerized solutions are also an option.

Even though this unique Alfa Laval flash vacuum deacidification system requires high temperatures and deep vacuum, it is a highly versatile set-up that can be used with a wide range of available utilities. For example, the replacement of steam with electricity for heating and vacuum duties is very easily achievable. Keeping the selection of utilities open means flexibility in site location, investment costs, waste management and operation.



AlfaDisc final heater

## The advantages of versatility

- If no high-pressure steam is available, it is possible to switch to thermal oil or even direct electrical heating
- If no medium-pressure steam is available for a vacuum system, it is usually possible to use mechanical vacuum systems because the vacuum load from the Alfa Laval flash deacidification system is only 10% that of a traditional stripping solution
- The Alfa Laval flash deacidification system can even operate in installations in which there is no steam available
- The system ensures water consumption is kept to a minimum, on account of effective heat recovery and an extremely small load on the vacuum system
- It is not normally necessary to upgrade the waste treatment plant to deal with greater deacidification capacity, because the effluent amount is very low
- If there is only limited space available for installing new systems, the Alfa Laval deacidification system is ideal because it only has a small footprint and each unit is low in height. Systems with small capacities can even be containerized.

Typical system layout