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

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Take the driver's seat

Alfa Laval deodorization solutions for fats and oils

Deodorization is an absolute necessity in processing edible fats and oils. How efficiently it is done determines what you can achieve in your processing operations as a whole, in terms of removing odours, pigments and volatile substances.

In this specialist field, Alfa Laval deodorization solutions are uniquely effective – quite simply a cut above all else.

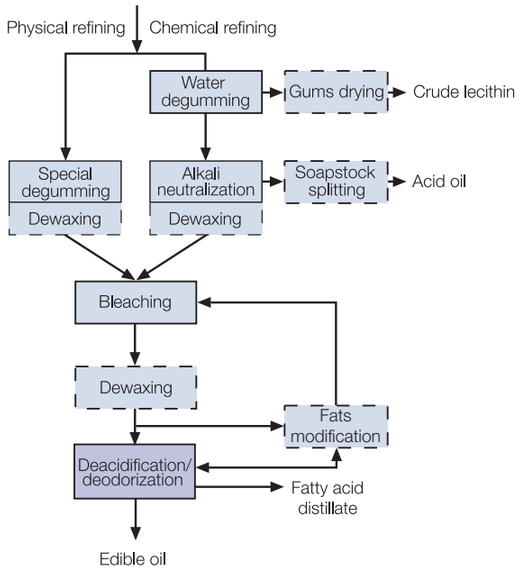
At Alfa Laval, we don’t just make do with traditional deodorization thinking – we develop new and better ideas that later set the standard for the whole industry.

Impacting the heart of the deodorization process

Patented thin-film technology sets new standards of efficiency

Deodorization is such a crucial part of edible fats and oils processing that the only way to really get ahead – and stay there – is to use the latest technology and the best equipment.

Alfa Laval’s patented breakthrough in applying thin-film technology to modern deodorization processes opens up important opportunities for taking your processing efficiency to a new level. It enables you to use less steam and to process the oil at lower temperatures. This results in more gentle, effective treatment that greatly benefits the quality of your fats and oils.



The Alfa Laval SoftColumn™ deodorization concept is also designed to be extremely versatile. Separate stripping and retention sections provide a wide range of options for implementing the most efficient deodorization solution currently available – both in new installations and when extending and updating existing fats and oils processing installations.

The raw materials

The large majority of commercially produced edible fats and oils stem from

- soybeans
- oil palm
- rapeseed/canola
- sunflower seeds
- maize/corn
- peanuts/groundnuts
- cottonseed
- coconut
- palm kernel
- fish and animal fats.

Multitude of uses

Alfa Laval SoftColumn deodorization solutions are particularly effective in

- deodorization of seed oils
- deacidification of tropical oils
- producing oils with a particularly low content of trans fatty acids (TFAs)
- removing problematic trace elements such as dioxins and pesticides
- processing fish oils and animal fats.

Essential for top-quality fats and oils processing

Removing undesirable impurities with vacuum and steam

An Indonesian first

PT Grahadura Leidongprima is a family-owned business on the island of Sumatra in Indonesia. The company is very successful in the palm oil processing industry. To cement this position, the company ordered the first SoftColumn deodorization plant in Indonesia, accompanied by dry fractionation plants.

This Alfa Laval SoftColumn deodorization installation provides the company with a processing capacity of 1,000 tonnes of palm oil daily.

Removing undesirable elements

When processing edible vegetable oils and animal fats, it is crucially important to remove any undesirable compounds that can affect flavour, odour, stability and colour.

Deodorization is a vacuum steam distillation process in which steam is passed through such oils at very low pressure and relatively high temperature in order to remove any such substances still present after the preceding processing stages.

Beginning with deaeration

Before heating the oil, air must be removed under vacuum (deaeration) in order to protect the quality of the product by preventing oxidation.

After leaving the deaerator, the oil is regeneratively heated in a special heat exchanger, the economizer, by the hot oil leaving the deodorization column. This ensures that as much heat as possible is recovered from the hot oil.

The oil then proceeds to a final heater where it is brought up to the exact temperature required for deodorization, normally using high-pressure steam.

Stripping and retention

When the oil has reached the designated temperature, it is fed to the deodorization column, which is the main component used for deodorizing edible fats and oils. Such a column can consist of a stripping section and a retention section.

When the oil passes through the stripping section, it is exposed to a combination of vacuum and steam that removes volatiles – including free fatty acids (FFAs) – that have a higher vapour pressure than the oil itself. If present, these volatile impurities affect the flavour, odour and stability of edible oils.

The oil is then held in a retention section for a certain amount of time for thermal treatment – known as heat bleaching – that deals with undesirable pigments and ensures the stability of the final product.

The length of time the oil is kept in the retention section depends heavily on the desired product specifications.

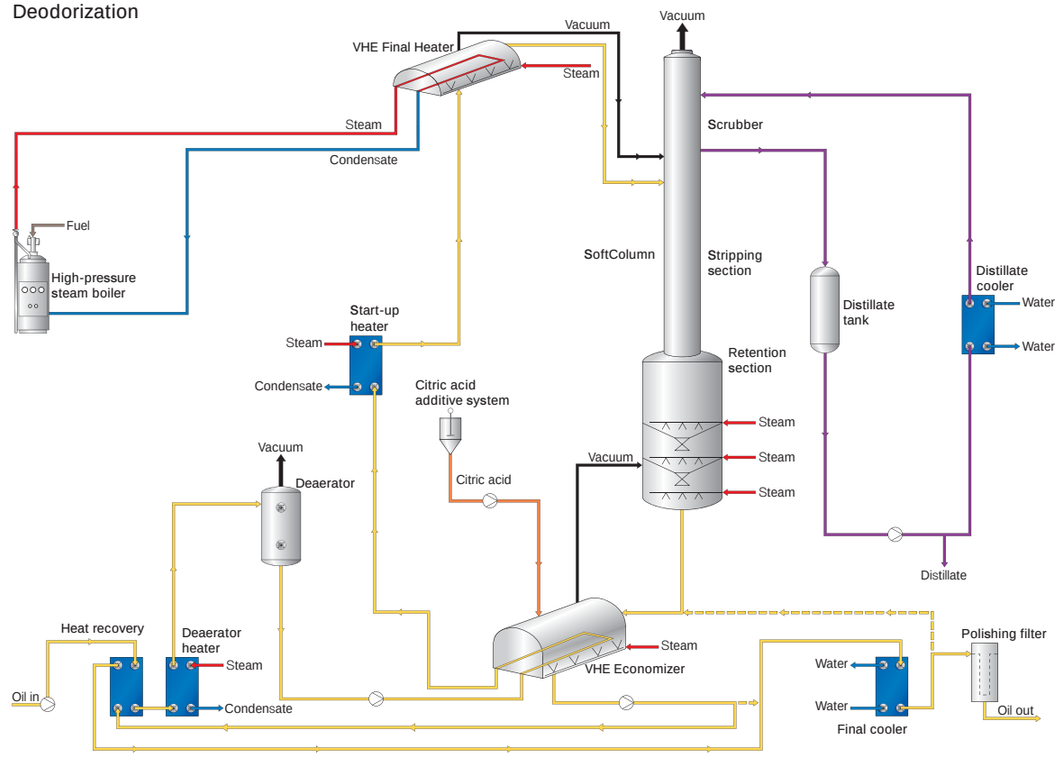
Condensing removed impurities

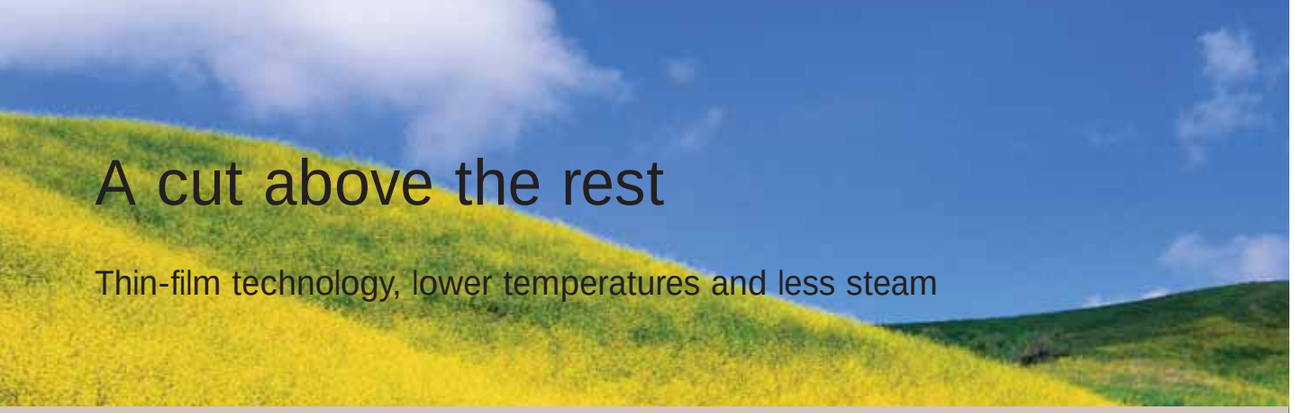
The volatile impurities that have been removed from the oil are condensed in a so-called scrubber unit, using recirculated and cooled distillate. The scrubber is either placed on top of the stripping section or built as a separate vessel.

Cooling

Finally the oil is cooled in two stages. First in the economizer, and then to the specified final temperature. It then undergoes polish filtration and is transferred to subsequent processes, storage or packaging.

Deodorization





A cut above the rest

Thin-film technology, lower temperatures and less steam

Traditional versus modern

In the traditional deodorization approach, the stripping of volatiles and heat bleaching are carried out simultaneously. However, this means that the oil is at higher temperatures for longer and that volatile substances are present throughout the treatment process.

In the modern Alfa Laval SoftColumn deodorization concept, on the other hand, the two parts of the deodorization process are kept separate. This ensures much better control of the process and fewer side reactions.
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Patented technology, better results

The groundbreaking Alfa Laval SoftColumn design features patented technology that makes the oil flow in a thin film down specially structured packing inside the column.

Minimum of steam

The steam enters from the bottom and flows counter-currently upwards. Together with the packing, this ensures that the greatest possible oil surface area is exposed to both vacuum and steam, under consistent, controlled conditions. This guarantees that the volatile impurities are removed rapidly and efficiently, using only a minimum of steam – thus cutting energy costs.

Less energy

A special Alfa Laval heat recovery economizer is used to heat the incoming oil, using heat from oil already deodorized. This ensures that less energy is required for heating the oil to the deodorization temperature.

Maximum flexibility

The SoftColumn design lets you adjust the colour of the oil as well as altering retention time and/or temperature at any point. Because the stripping and retention sections are separate, it is even possible to operate with different temperatures in each section, providing you with the best possible control of the deodorization process.

Other flexibility advantages include

- the system can be designed to switch between chemical and physical refining, as you require
- the plant can be run at lower capacity without increasing retention time.

Special SoftColumn features

- ultra-efficient thin-film technology
- rapid stripping at lower temperatures and using less sparge steam
- achieve better control of anti-oxidant levels, tocophenols, trans fatty acid formation and final colour via the flexible retention time
- stripping and heat bleaching kept separate
- modular system that is versatile, robust and easy to maintain.

Prevents side effects

Using the stripping-first/retention-later principle boosts deodorization performance significantly because the retention section operates with “clean” oil that has already been deacidified, thus helping prevent undesirable side effects.

The lower temperature and process time keep the formation of trans fatty acids to a minimum without compromising other quality parameters.

Self-cleaning, no odours

The unique structure of the packing in a SoftColumn deodorization column means there is no risk of clogging or polymerization. The resultant flow pattern and the high turbulence this creates, along with optimized oil distribution and the completely airtight design, mean the installation is self-cleaning and free of odour.

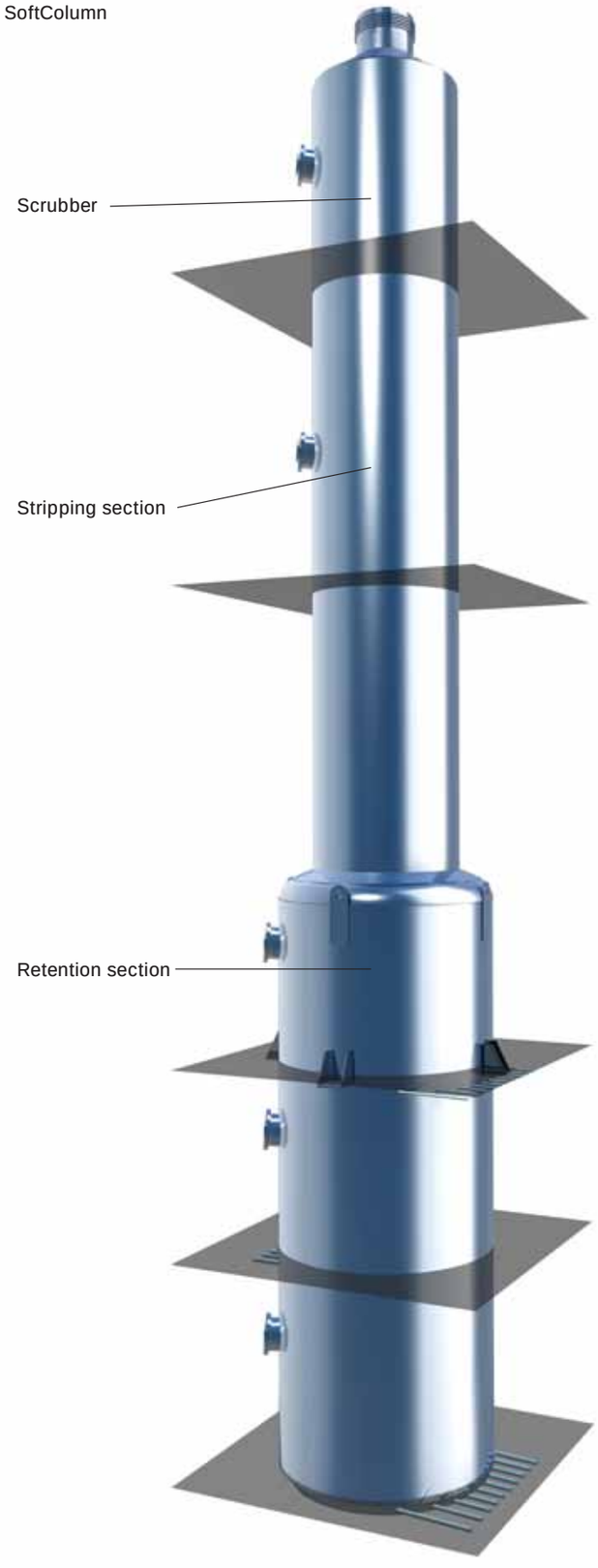
The same structured packing technology is used in the scrubber unit to condense the volatiles removed from the oil.

Benefits add up

The Alfa Laval SoftColumn deodorization concept provides multiple benefits

- lower steam and energy consumption reduces operating costs
- gentle treatment boosts product quality
- added flexibility in both installation and operation
- no air leakage, and undesirable side effects kept to a minimum
- self-cleaning design cuts maintenance costs.

Alfa Laval SoftColumn



More than the sum of the parts

Complete deodorization concept available in modules

Largest in Latin America

The Bunge Group is a global agribusiness and food operation. The group's Food Products division is Latin America's largest oilseed processor and largest seller of bottled oils to the retail market. To extend this position, Bunge has invested in the largest vegetable oil refinery in Latin America. Located in Brazil, this major plant has a capacity of 1200 tonnes per day.

Alfa Laval is responsible for the complete refinery, featuring a neutralization section with two PX 110 separators, a bleaching installation and a complete SoftColumn deodorization solution.

A complete Alfa Laval SoftColumn deodorization solution consists of four modular sections. These can be installed separately to perform particular duties, but they are also ideal for combining into one highly efficient deodorizing system that will provide a significant boost to both your processing capacity and the quality of your finished fats and oils products.

Stripping section

Oil flows evenly down the structured packing in a thin film while steam flows counter-currently. This exposes the oil effectively to the vacuum and stripping steam.

Design features include

- specially structured packing with an extensive surface area reduces the amount of stripping steam needed and cuts down on retention time
- special packing with no stagnant zones creates a self-cleaning effect that ensures continuous operation.

Retention section

With a retention section that allows considerable flexibility in retention time and operating conditions, the deodorization process can be controlled and optimized to an even greater degree.

Design features include

- special design that provides first-in/first-out flow
- flexible holding time
- rapid draining at stock changes and shutdown
- internal actuators that use steam as pressure medium, preventing air leakage into the system.

Scrubber

The Alfa Laval Scrubber is a structured packing column designed to condense and recover FFAs and other volatiles from the deodorization process, and to prevent these being carried over to the vacuum system.

Design features include

- structured packing with an extensive contact area that results in high efficiency and reduces the amount of recirculation flow distillate required
- self-cleaning as a result of the turbulent flow
- demister located just prior to the vapour outlet to ensure that any small droplets are retained.

VHE Final Heater

The patented Alfa Laval VHE (vacuum heat exchanger) Final Heater raises the temperature of the oil to that required for deodorization, under vacuum and sparging steam conditions. The highly turbulent flow on the shell side of this high-efficiency heat exchanger prevents the product overheating on the tube surface.

Design features include

- counter-current flow pattern due to special design of heating tubes and baffles on shell side
- special baffle system ensures low velocity at vapour outlet
- sparge steam injected through perforated tubes on the bottom of the shell, below the heating tubes
- low liquid level to ensure the desired flow path
- sparge steam tubes can be removed from outside for manual cleaning.

Alfa Laval VHE Final Heater

VHE Economizer

The Alfa Laval VHE Economizer provides gentle, highly efficient cooling of the deodorized oil, producing a better-tasting oil of higher quality.

Due to the patented counter-current flow pattern and large heat exchange surface, VHE Economizer units achieve a particularly high heat transfer rate, with heat recovery levels in excess of 80%, in one single unit.

Volatiles that continue to form as the oil cools are stripped promptly, and removed by the sparging steam and vacuum.

Design features include

- sparge steam injected through perforated tubes on the bottom of the shell, below the heating tubes
- incoming oil heated in multipass U-tubes with high-turbulence flow
- shallow channel system with baffles for optimized plug flow
- connection for dosing antioxidant, in final channel
- first-in/first-out flow for controlled cooling under consistent conditions
- completely airtight to prevent oxidation.

Alfa Laval VHE Economizer

Upgrading existing deodorizers

New paths for boosting production of fats and oils

Deodorizer upgrades made easy

If you currently operate a deodorizer installation and wish to

- boost capacity
- improve product quality
- reduce production costs
- achieve greater flexibility

you can simply re-use your existing deodorizer column by incorporating it into a new, improved Alfa Laval SoftColumn installation – no matter what make your current equipment is.

The major Alfa Laval upgrade components are the stripping section, the scrubber, the VHE Final Heater and the VHE Economizer. These modular installations can all be connected to your existing deodorization column, with only a brief interruption of production.

The upgrade advantage

Adopting the individual sections of the Alfa Laval SoftColumn deodorization concept to existing installations brings you advantages that include

- increased capacity
- better product quality
- greater efficiency
- limited capital investment.

Re-using existing capacity

Your existing vacuum system and the high-pressure boiler or thermal fluid heater can normally be re-used in an Alfa Laval SoftColumn solution that is on a larger scale. This is possible because it uses less steam and recovers more heat at any given capacity.

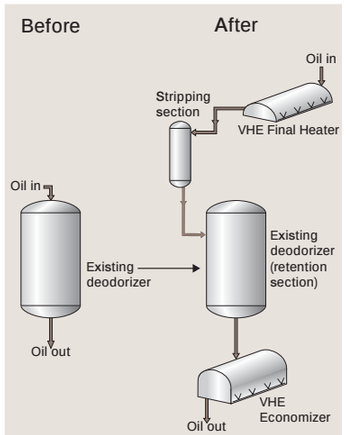
Retrofit in stages

You can also choose to upgrade your processing system gradually, with new equipment brought online in planned stages.

A new stripping section can be added to your existing tray deodorizer to increase capacity, boost efficiency and reduce operating costs. This will enable you both to boost the flexibility of your process set-up and to improve the quality of your end product.

A VHE Final Heater can be installed if the existing heater equipment is no longer able to heat the oil to comply with your operating requirements.

A VHE Economizer can be incorporated to improve product quality and save on energy costs.



Example of increased capacity:

100 MTD → 250 MTD
300 MTD → 500 MTD

A solution for carryover

If you are having to deal with problems that involve carryover, dirty cooling towers, environmental pollution or poor distillate recovery, Alfa Laval can also provide a separate scrubber.

This can be installed with any existing deodorization column and is based on the same structured packing technology as the Alfa Laval stripping section.

Nonstop Performance

The retrofit payback

The Imcopa soybean oil refinery in Brazil decided on an upgrade path to tackle very high steam costs, plus problems with poor heat recovery in the company's existing plant.

Benefiting from the Alfa Laval retrofit concept, Imcopa upgraded an existing deodorizer as well as installing a new neutralization and bleaching line, plate heat exchangers, mixers and a PX 95 separator. This enabled the company to boost refinery capacity from 400 to 600 tonnes per day.

This retrofit strategy, combined with Alfa Laval heat transfer technologies, enabled Imcopa to reduce overall production costs by more than USD 3 per tonne of oil – the investment pays for itself in less than two years.

Process know-how

One of the key advantages of working with Alfa Laval to install, update and extend your deodorization installation and equipment is our extensive practical experience.

Alfa Laval's proven ability to design and calculate a wide range of process configurations to meet specific customer requirements can provide you with the benefits of our vast body of accumulated know-how.

Engineering services

Alfa Laval provides a wide range of supplementary engineering services that can help ensure that your new installation comes on line as rapidly and efficiently as possible.

We can also provide you with considerable savings by ensuring full compliance with the relevant national and international regulations for design codes, safety procedures and best engineering practice.

Alfa Laval engineering services include

- installation design in full accordance with international standards
- installation supervision
- commissioning and start-up
- operator training
- documentation
- comprehensive spare parts packages
- operational, maintenance and service support.

Full control

Alfa Laval has full control over the entire supply chain associated with the company's equipment. This means we can provide customers with prompt responses, excellent availability and lead times that are second to none.

Service counts

Alfa Laval operates with a highly sophisticated Nonstop Performance concept made possible by our worldwide network of service and spare parts distribution centres in more than fifty countries throughout the world.

Our expertise ensures that any service work required is carried out with the absolute minimum of disturbance to operations.