



## AlfaVap™ system

### A cassette evaporator for high viscosity products

#### Applications

AlfaVap cassette evaporators are designed for concentrating process liquids that contain dissolved and finely dispersed proteins of animal or fish origin, such as:

- stickwater from fishmeal plants
- glue water from meat by-product plants
- fish extracts and bouillon products
- canning cooking water
- meat extracts and bouillon products
- fish or meat-based hydrolysate products
- fish silage products
- gelatin products

AlfaVap cassette evaporators are also supplied in food-grade quality, which means that all inner parts can be effectively cleaned by a CIP (Cleaning-in-Place) cycle. This is available as an automatic program integrated into the controls of the AlfaVap system.

#### Cassette evaporator design

AlfaVap cassette evaporators combine the state-of-the-art thermal technology and know-how available from Alfa Laval into very compact evaporator units, which come in standardized models or can be customized to meet individual requirements.

The AlfaVap system is available as a single-stage, two-stage or three-stage evaporator – depending on the heating medium, throughput or specific concentration demands of the end product.

The modular AlfaVap skid concept includes all the main components of the evaporator, such as one or more cassette evaporator stages with circulation pumps, vapour condenser, vacuum pump station and concentration monitoring equipment. Each cassette stage is arranged within a frame, which can accommodate different numbers of cassettes. This means that any moderate increase of throughput is possible without additional installation work.

The electrical control and monitoring panel can be placed alongside the evaporator or more centrally in a general control room.



#### Cassette evaporator operation principle

The AlfaVap cassette evaporator works on the basis of the so-called rising film principle, partly enabled by forced circulation. However, unlike other evaporators based on this technology, the AlfaVap system conducts practically all of the evaporation within the cassettes. These thus serve almost as foam-filled boiling chambers, with very high velocities of the evaporating medium.

The cassettes are equipped with special corrugated surfaces that create a high rate of turbulence throughout the entire product chamber, which results in high heat transfer coefficients. This high turbulence and the rising foam film also eliminate wetting problems and dead spots, which again substantially reduces any tendencies to fouling. This means longer operation periods between cleaning cycles.

#### Evaporation step by step

The following step-by-step description is based on a two-stage evaporator, but the basic principles also apply to three-stage evaporators, or can be transferred to single-stage evaporators.

The cassette evaporator stage I is heated by steam, which circulates in the closed welded compartments of the cassettes. Pumps evacuate the condensate, as the steam pressure in the cassette may become less than 1 bar abs.

The product is circulated through the detachable compartments of the cassette stack, and is led into these compartments in stage I via a regulation valve, controlled by the level monitor in the cyclone separator I.

This controlling loop ensures that fresh product is led to the evaporator at the same pace as the evaporation removes water from stage I.

The product is optimally led to the evaporator at a temperature practically equal to the product boiling temperature in stage I. The usual operating temperature is between 55°C and 98°C.

The vapours from cassette stage I are separated from withdrawn mini droplets, etc. in the cyclone separator I. They are then drawn through the closed compartments of the cassette evaporator stage II, now serving as the heating medium, by the vacuum pump. The vacuum pump imposes a vacuum at stage II, which normally corresponds to the boiling temperature of the product. At the same time, it evacuates the evaporated vapours from stage II together with the non-condensable gases.

The vapours are condensed in a plate heat exchanger by means of cooling water, and pumped away as condensate, while the non-condensables are removed by the vacuum pump.

The concentration of the product circulated in stage II is measured continuously. When the desired concentration has been reached, the product is pumped out of the stage II circulation circuit as final concentrate. When concentrate is

extracted and the water has evaporated, the level in the stage II circuit falls.

This is detected by the level monitor in the cyclone separator II, which controls the regulation valve for product intake from stage I. In this way, the complete evaporator becomes an integrated, controlled system, which operates fully automatically.

### Mode of application

Alfa Laval system units are available in the following models, driven by:

- live Steam (LS)
- waste Heat Evaporator (WHE )
- thermal Vapour Recompression (TVR)
- mechanical Vapour Recompression (MVR)

Steam booster for existing evaporators – boosting any stage in parallel or series.

### Optional extras

- The AlfaVap system can be delivered as a booster unit to add onto existing evaporators, boosting any stage in parallel. The boosting stage evaporation can be driven by steam or waste heat vapour.
- The AlfaVap system is available in configurations that can handle extremely aggressive process liquids, as the cassette can be delivered in titanium.
- The AlfaVap system is available in a special sanitary version to meet all standard food-grade requirements.

### Technical data

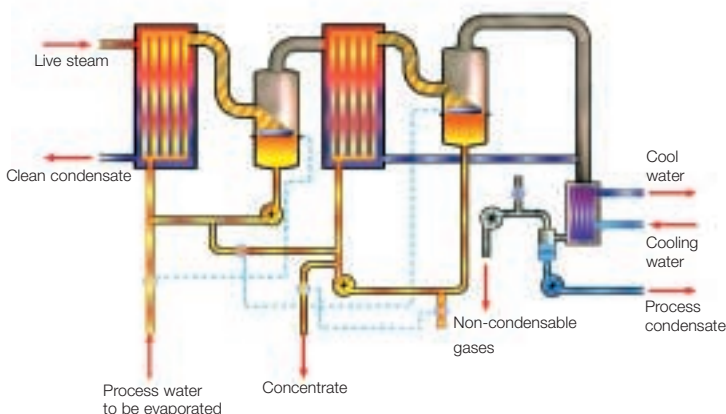
#### Materials:

Product wetted parts in acid-proof stainless steel or titanium. Cassette evaporator frames in mild steel, painted. Base frame assembly in stainless steel.

### Capacity and dimensions

#### AlfaVap with TVR

	Capacity (kg/h)	Dimensions L x W x H (metres)
Single-stage	1,000	4.30 x 3.80 x 4.60
	1,600	4.30 x 4.40 x 4.60
Two-stage	2,500	7.00 x 3.85 x 5.00
	4,000	7.00 x 3.85 x 5.00
	6,000	7.00 x 4.45 x 5.00
Three-stage	8,000	7.00 x 4.45 x 5.00
	10,000	10.00 x 5.00 x 5.50
	16,000	10.00 x 5.50 x 5.50



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Alfa Laval reserves the right to change specifications without prior notification.

#### 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.