

## SAMVAC® -The Short Path Evaporator

Short path distillation is a thermal separation technique that lowers the boiling point of the substances to be evaporated by means of a medium high vacuum in the range of 1 to 0.001 mbar. It is an excellent method for gently treating heat sensitive, high boiling products. In theory, as well as laboratory scale, it has been known for about five decades. However, on an industrial scale, it is now about 30 years that the first short-path evaporators applying thin film technology, have appeared on the market. They all consist basically, of a cylindrical body with a heating jacket, and a rotor inside which creates a mechanically agitated, thin product film on the heating surface inside of the body. By means of gravity, this film flows downwards, whereby the volatile portion of the product evaporates and passes by the shortest route and with practically no pressure drop to the internal condenser where it is precipitated on the tubes. The non-volatile portion reaches the lower part of the evaporator and leaves it through the bottom product outlet. The residual vapours and inert gases flow through the vacuum nozzle to the vacuum system. (see figure 1 "Basic Short Path Evaporator"). The heating temperature usually applied varies between 200 and 350 °C.

Demands for cutting deeper into high boiling product mixtures means one has to give serious thoughts about how to exceed this limit. On the other hand, handling the distillation residues can be very demanding. They may get quite viscous or contain fine solids or may even have the tendency to foul the heating surface. All these processing requirements have led to the development of the INDUTHERM® SVI fine vacuum evaporator which has considerably widened the field of application of fine vacuum evaporation.

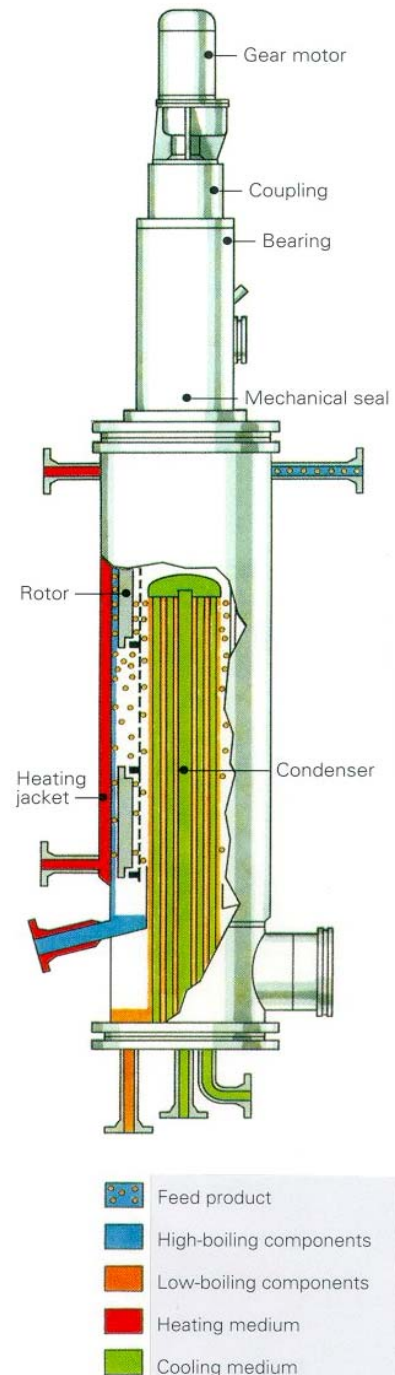


Figure 1 : Basic Short Path Evaporator

## The SAMVAC® Rotor-System

The special rotor and feed distribution system is based on the principle of the thin film evaporator type SAMBAY® proven in application for over 50 years. Mobile precision wiper blades are fixed to the supporting structure of the rotor. (see figure 2 “SAMVAC® Rotor”) They are forced by centrifugal force to fold open in direction of the heating surface and are pressed against this. The wiper blades in motion along the evaporating zone dip into the product and immediately spread a highly turbulent thin film over the heating surface. Even wetting of the heating surface and high turbulence level within the thin film create ideal conditions for heat and mass transfer.

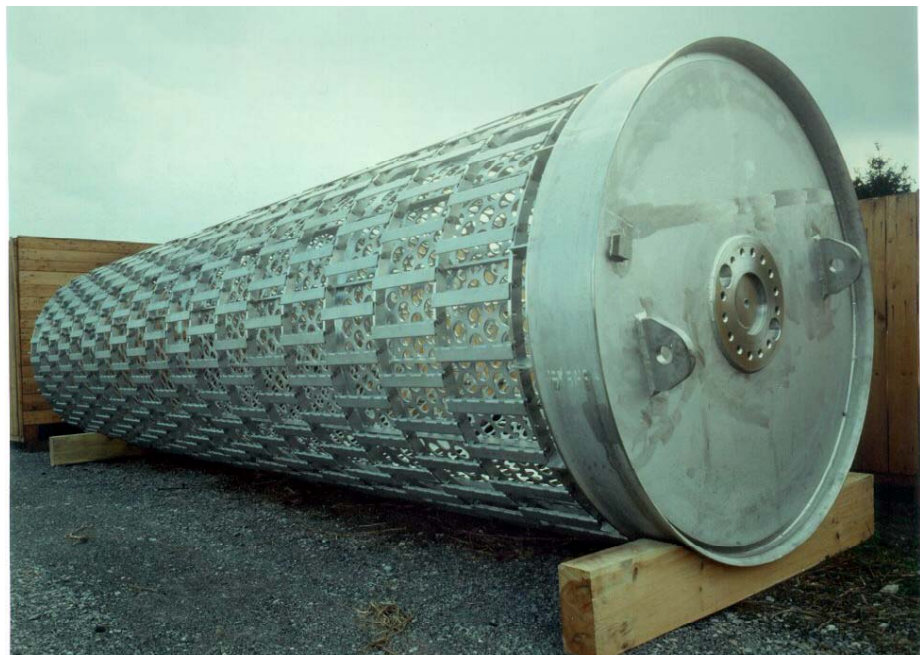


Figure 2

SAMVAC®-Rotor

The SAMVAC® is therefore, specifically well suited to applications with demanding specifications as to operating temperature and pressure as well as product characteristics for the following reasons:

- Wide heating temperature range (200-400°C)
- High specific heat transfer rates due to turbulent product film even in case of viscous products and use of clad material for the inside shell. In many cases this allows to choose a smaller size unit for a given application.
- Low maintenance costs due to precisely machined inside of the evaporator body and unique rotor design avoiding wear of rotor blades even at extreme operating conditions.
- Very little down time due to above facts and the sturdy design of the evaporator body, rotor and bearing system.

## Special Product Requirements

### High boiling products

Boiling temperatures of 300°C at 0.001 mbar can be realized.

### Viscous products and products containing solids

In case of viscous products deep immersion of the wiper blades into the product film subject the product to an intensive shearing effect, reducing the viscosity by a considerable margin. It is therefore, possible to process products with a viscosity up to 50 Pa.s. The deep immersion of the wiper blades in the product film and the resulting intensive mixing effect prevents also fouling of the heating surface in particular due to solids contained. This is a very important feature especially in cases where the distillation residue gets difficult to handle.

### Colour sensitive products

In the standard version of the SAMVAC® the wiper blades are fitted with a stopper. This allows the wiper blades contact with the heating surface, while preventing metal abrasion. This feature is very important in case of handling colour sensitive products because the non-volatile portions of the product flow through the SAMVAC® without its colour being affected.

### High evaporating ratios

Use of precision wiper blades also means that even small material flow volumes are distributed evenly over the heating surface resulting in total wetting of the heating surface. This allows to operate the unit at high evaporating ratios. This means that even in cases where more than 90% of the feed is evaporated, constant bottom product quality levels can be achieved.

## Some typical applications

Generally speaking, SAMVAC® evaporators are specifically well suited for evaporation, concentration, distillation and devolatilizing of products with increased viscosity, containing solids, fouling the heating surface or with extremely high boiling characteristics. The applications listed below are just some typical ones.

- Devolatilizing silicone oils, silicone resins, silicone polymers, rosin acids and esters.
- Distilling high boiling volatile components from residues containing catalysts in form of fine
- Distillation of oil and wax fractions boiling in the range of 550 to 750°C from petroleum The SAMVAC® must keep the heating surface clean by continuously removing fine carbon particles together with asphaltenes, metals and other impurities.
- Fractionating of waxes into hard and super hard waxes
- Distilling of high boiling volatile components from bitumen.
- Stripping of TDI from Prepolymer