Plate Evaporators

During the plate evaporation process, liquid is pumped between thin plates with the heating medium on the mating surfaces. The product is then evaporated with the vapor generated forming a high velocity core. This expansion in volume causes a high-velocity, thin film on the heat exchange surface providing efficient heat transfer.

Plate evaporators should be considered for applications that have:

- Capacities up to 27,000 kg/h water removal
- A need for future expansion
- Limited head space
- A particle size smaller than 600 Micron.
Product Range

**Rising/falling film plate evaporators**
The original plate type evaporator, the Rising/Falling Plate system is a flexible, multi-duty unit engineered to handle medium size production runs of heat sensitive products. Most are used by fruit juice and other food processors where low residence time and 104°F to 203°F (40°C to 95°C) operating range temperatures are essential for the production of quality concentrate. In increasing numbers, many are being used in pharmaceutical and chemical plants for antibiotics and inorganic acids. To permit relatively high concentration ratios to be carried out in a non-recirculatory, single pass flow, these evaporators may be designed as multi-effect and/or multi-stage systems. Water removal capacities range from 500 to 15,000 kg/hour. For much smaller production or pilot plant runs ranging from 50 to 700 kg/hour a "Junior" plate evaporator is offered. This packaged system can be provided as a single effect unit requiring only 3.5 m² of floor space or with multiple effects for larger operations.

**Falling film plate evaporator**
Combining all the advantages of the original Rising/Falling Film Plate Evaporator with the added benefits of even shorter product residence time and larger capacities, the APV Falling Film Plate Evaporator is widely used by many processors. With its larger vapor ports, evaporation capacities typically are up to 20 to 27,000 kg/hour of water removal. Furthermore, residence time is about 25% shorter, providing even greater assurance of protection against thermal degradation.

**Paravap**
The APV Paravap is specially designed to process high solids concentrates or those having non-Newtonian viscosity characteristics. Operating advantages include low rates of fouling and minimal product residence time to protect against thermal degradation. Unlike wiped film evaporators, this unit has no moving parts, reducing both capital and operating costs. Under normal operation, feed liquor and the heating medium are directed to alternate passages formed by the positioning of heat transfer plates within the evaporator. As the feed contacts plates heated by steam or hot water, boiling occurs. Small plate gaps and corrugated plate patterns create high vapor velocities and turbulence which result in a very high rate of heat transfer. The liquor is vaporized, and the concentrated product and vapor are discharged to the separator.

**Paraflash**
For products which tend to crystallize during concentration or those that contain a high percentage of suspended solids, SPX offers the APV Paraflash. This compact unit combines a plate heat exchanger, an external separator, and a vacuum system. It is designed to operate as a forced circulation, suppressed boiling evaporator. By using liquid static head above the heat exchanger or a special orifice piece in the discharge line, vaporization is arrested until the product liquor flashes into the separator. Any crystallization then occurs and a suspended slurry results. High liquid velocity flow combined with induced turbulence deters scaling on heat transfer surfaces, and promotes longer production runs.
Features/Benefits:

- **Improved product quality.** The short heat contact period resulting from single pass operation and low liquid holdup eliminates product deterioration even when highly heat sensitive liquids are involved. The resulting concentrate is of the highest quality possible.
- **Higher product concentration.** The variety of plate evaporators available from SPX allows custom concentrates to be produced. Ninety seven percent total solids or better are possible depending on feed material characteristics.
- **Low liquid holdup.** Very little product is actually in the plate evaporator at any time. This permits rapid start-up and shutdown with minimal waste. Small quantities of product may be processed economically.
- **Easily cleaned.** All stainless steel surfaces within the plate packs are fully accessible for easy cleaning. Normal CIP is done with low consumption of cleaning chemicals due to the low liquid holdup.
- **Flexible capacity.** By simply adding or removing plate units, varying evaporation rates may be achieved. Large expansions are possible with additional frames and plate units.
- **Low installation costs.** Due to the compact size and low weight, no cranes or special foundations are required for installation. Typically, an existing building on site is suitable and installation time is minimal.