APV SINGLE EFFECT SR-25 PARAVAP PLATE EVAPORATOR

Original Owner: Payson Fruit Growers
Year Built: 1997
Application: The evaporator is designed to process 832 lbs/hour of 35 Brix Syrup, into 416 lbs/hour of 70 Brix Syrup. This unit has been designed to run high viscosity products and can be used for other products other than syrup.
Design Evaporation Rate: The design evaporation rate is 416 lbs/hour of water. This Evaporation rate is somewhat variable depending on the conditions run.
Equipment Included:

- Control Panel
- 30 Gallon Feed Balance Tank
  - Level control system
  - Emergency water make up system
- APV Feed Pump
- Hot Water set system
  - Temperature controller
  - Tubular heat exchanger
  - APV Circulation pump
  - Steam control valve
  - Misc valves and fittings
- APV SR-25 Plate Heat Exchanger
- 18" Vapor Separator
- APV Product Recirculation pump
- Tubular vapor condenser
- SiHi Vacuum pump
- All valves, piping and misc equipment needed for system
- All mechanical Temperature and Pressure/Vacuum gauges needed.
- All equipment is mounted on a SS skid.

Documentation Included:

- Drawings
  - P&ID
  - Electrical
  - GA
  - Pipe Map
  - SR-25 Heat Exchanger
- Process Control description
- APV Evaporator Start-Up Instructions
- APV Rise-Out Procedure
- APV CIP Procedure
- APV Evaporator Shut-Down Procedure
- Service Manual

Overall Dimensions: 9 ft 8 in L x 7 ft W x 8 ft 4 in H.

All product contact surfaces are food grade polished 316 SS.

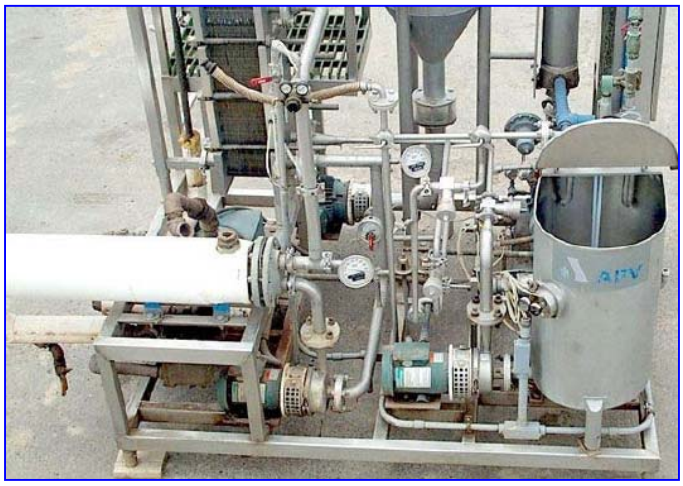
This complete system would make an ideal test evaporator, a pilot plant evaporation system or an evaporation system to do small quantities of highly valuable product. All it needs to run is to be hooked up to a low pressure steam source (30 PSIG), a power supply (440 V) and a water supply (approx 40 GPM total).

Install, Startup and Training supervision available upon request.









APV Evaporator

Flow Path of Syrup

The syrup at approximately 40 degrees F is puimped from the storage tank by a supply pump to the paravap feed
balance tank. The flow rate is regulated into the balance tank by a float type level control and pneumatic control valve.
The float is connected to an air regulator which changes the air pressure as the float is displaced up or down by the level in the feed balance tank. As the level goes down the float decreases the air pressure, which causes the pneumatic valve to open to allow more syrup into the feed balance tank. As the level rises, the float increases the air pressure which causes the pneumatic valve to close, reducing the amount of syrup going into the feed balance tank.
A manual shut-off butterfly valve has been provided to positively isolate the Paravap feed balance tank. A low-level water make-up system hasn been provided on the feed balance tank to protect the Paravap from running dry.
The low water make up system consists of a level probe, and an electric solenoid valve mounted on the process water line to the feed balance tank. If the level falls to a low level in the feed balance tank, the level probe activates a relay, which opens the solenoid valve, allowing water into the feed balance tank. This protects the Paravap from running dry. As the level rises in the feed balance tank, the level probe resets the relay. This shuts off the solenoid valve and water make-up.
From the feed balance tank, the syrup is pumped by an APV "W" 20/20 pump through a graduated control valve (GCV) to the Paravap. The feed GCV is the main feed flow control valve to the Paravap. It is marked for repeatable performance. The operator manipulates this valve to control the feed rate to the Paravap.
From the feed GVC, the syrup is piped to the Paravap plate pack. As the syrup enters the bottom of the plate pack, it begins to climb in a film in alternating plates, absorbing heat form the plate.
The water in the syrup begins to evaporate. The syrup and water vapor that has been formed by evaporation leaves the plate via the outlet port at the top of the plate pack. This outlet is common to all the plates. From here, the syrup/vapor combination travels to the separator. The syrup has been in contact with the plate heating surfaces only a few seconds. the energy to heat the plates in the Paravap comes into the plate pack effect via the hot water set.
The hot water set recirculation pump circulates hot water through the tube side of a shell and tube heat exchanger. Steam is regulated into the shell side of the shell and tube heat exchanger via a pneumatic temperature control valve. The position of this valve is determined by a Fultrol temperature controller sensing the hot water temperature as it leaves the shell and tube heat exchanger. The heated water then flows to the Paravap plate pack and heats the syrup to cause evaporation. The cooled hot water circulates back to the hot water recirculation pump and the cycle continuously repeats itself. Steam that has condensed onto the shell side of the shell and tube heat exchanger is removed via a steam trap.
As the syrup/vapor combination leaves the plate pack, it travels to the seperator. The separator is tangential type. The separator s a vessel designed to provide enough centrifugal action and volume so that the syrup/vapor combination can slow down

.
The syrup will fall or separate out of the vapor. Hence the name separator. As the syrup falls to the bottom, the vapor rises to the top. The water vapor is steam.

The Paravap has a syrup recirculation/extraction pump at the bottom of the separator. This is an APV WI 20/20 pump. This pump takes syrup out of the separator and recirculates it back to the feed line or the final product line. The recirculation feature is provided to insure that the Paravap has enough liquid flow going through it to keep all the product plate surfaces wet. Product burn-on and product degradation could occur if this recirculation wan not provided. This recirculation is regulated byh the recirculation GCV.
The excess concentrated syrup in the effect is then pumped out of the separator with the recirculation/extraction pump. The separator level is controlled by a final GCV.
The energy level of the steam leaving the separator is no longer recoverable economically. This energy is dispersed to the cooling water as the steam condenses in the condenser. About 15 gallons per minute of 65F cooling water is pumped through the condenser. The cooling water is heated to approximately 105F.
The condensate formed in the condenser by condensing the steam vapor boiling off the syrup falls into the suction of the vacuum pump. This is a Sihi vacuum pump. The Sihi is a two-stage liquid ring type of vacuum pump. The Sihi vacuum pump's function is to pump out as much air as possible out of the Paravap during start-up and to keep air and condensate form accu-mulating in the condenser while the Paravap is running.
After the final GVC, the concentrated syrup is extracted to a manifold of two three-way valves located over the feed balance tank.With this manifold and valves, the operator can route the concentrated product to the drain, back to the feed balance tank or to the concentrate production line.
A Control Panel is provided with on/off switches for all the evaporator pumps.

Overall Dimensions

9 ft 8 in L x 7 ft W x 8 ft 4 in H