

# DOUBLE EFFECT ASCENDING FILM EVAPORATOR



SERVICE : 230 V / 50 HZ / SINGLE PHASE: 1 KW. COLD WATER 10 ° C / 3 BAR: 600 L / H. STEAM 4 BAR: 4 KG / H. EMPTY 10 MBAR: 20 NM3 / H SEWER FOR HEATING CONDENSATES.  
DIMENSIONS : 2, 5 M X 0, 6 M X 3, 8 M

WEIGHT : ~ 200 KG

REFERENCE : MP1052

## Principle of operation

Evaporation for the purpose of concentrating a solution composed of a volatile solvent is of a less volatile solute.

Ascending film evaporation is a continuous process where the solution is heated in a monotubular vertical evaporator to vaporize the solvent. (First effect).

In the head cyclone, the mists, formed by the vaporization of the solution which are composed of solvent vapor and concentrated solution, are separated into two phases: the concentrated liquid phase is discharged by gravity and then sent via a metering pump into the second evaporator while the vapor phase is used as heating of the second evaporator.

In the second rising film evaporator, the already concentrated solution is heated, under reduced pressure, to vaporize the solvent (second effect).

In the secondary cyclone, the mists formed by the vaporization of the solution which are composed of solvent vapor and concentrated solution are separated into two phases: the concentrated liquid phase is removed by gravity and then stored and the vapor is condensed before to be collected in a recipe.

## Educational Objectives :

- Continuous concentration of a solution by evaporation.
- Influence of the operating conditions.
- Thermal balances
- Material balances

## Technical specifications :

### Equipment

- Storage canister of the feed solution.
- Feeder dosing pump of the first effect.
- Ascending film evaporator (first effect), borosilicate glass ferrule and 316L stainless steel steam pipe; removable insulation.
- Borosilicate glass cylindro-conical cyclone for liquid-vapor separation.
- Dosing pump feeding the second effect.
- Ascending film evaporator (second effect), borosilicate glass ferrule and 316L stainless steel steam pipe; removable insulation.
- Borosilicate glass cylindro-conical cyclone for liquid-vapor separation.
- Vertical condenser, borosilicate glass ferrule, 316L stainless steel coil heat exchanger.
- Solvent coolant made of 316L stainless steel.
- Borosilicate glass solvent recipe, graduated.
- 316L stainless steel concentrate condenser
- Recipe of borosilicate glass concentrate, graduated.
- Vacuum trap made of borosilicate glass.
- Circuit of relaxation and adjustment of the first effect heating steam with operator protection panel.

- 316L stainless steel connection pipes for the process and reinforced PVC for the cooling fluid.
- Support frame in 304L stainless steel tubes and aluminum nuts.

### **Instrumentation**

- Condenser cooling water supply equipped with a float flowmeter.
- Measurements of the supply pressure of the heating vapor of the first effect by manometers.
- Measurement of the supply pressure of the heating vapor of the second effect by manometer.
- Measures the pressure of the process by manometers.
- Control and control cabinet, IP55, equipped with an emergency stop, operating buttons and the following interfaces: Two digital temperature indicators of twelve Pt100 ? probes.