

**Case study: Vacuum Drying active pharmaceutical product**

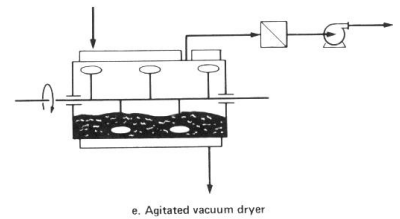
**Application:**

Active pharmaceuticals are used as medicines and are injected in human body for anti virus applications. Critical are the temperature sensitivity of this products which require extremely gentle drying. Final moisture content of the powder has to be as low as possible. Batch integrity and homogeneity are essential process requirements

The **present production process** for this products are horizontal agitated dryers.

**Requirements product**

Moisture content	:	< 0,1% W.B.
Max product temperature	:	< 60 °C
Particle size distribution	:	no agglomerates
Bulk density	:	high as possible



**Solution:**

Active pharmaceutical products are extremely sensitive for heat and drying shall be performed at low temperature and lowest possible pressures. Also the high value of these product is to be considered.

The general problem with HORIZONTAL dryers are the loss of product in the bottom section and the difficulties to discharge the dryer. Further flexibility in batch size is limited for this type of dryers.

It requires long periods to discharge the horizontal dryer and product losses are considerable. Due to the VERTICAL shape and the agitation of the product in the CONICAL VACUUM DRYER the discharging time is strongly reduced. Product residue in the dryer after discharging are minimal and can be limited to values below 1% Combination of low-pressure and low-temperature drying ensures a good product quality without degradation of product and low product moisture levels.



*External view Vacuum Dryer*

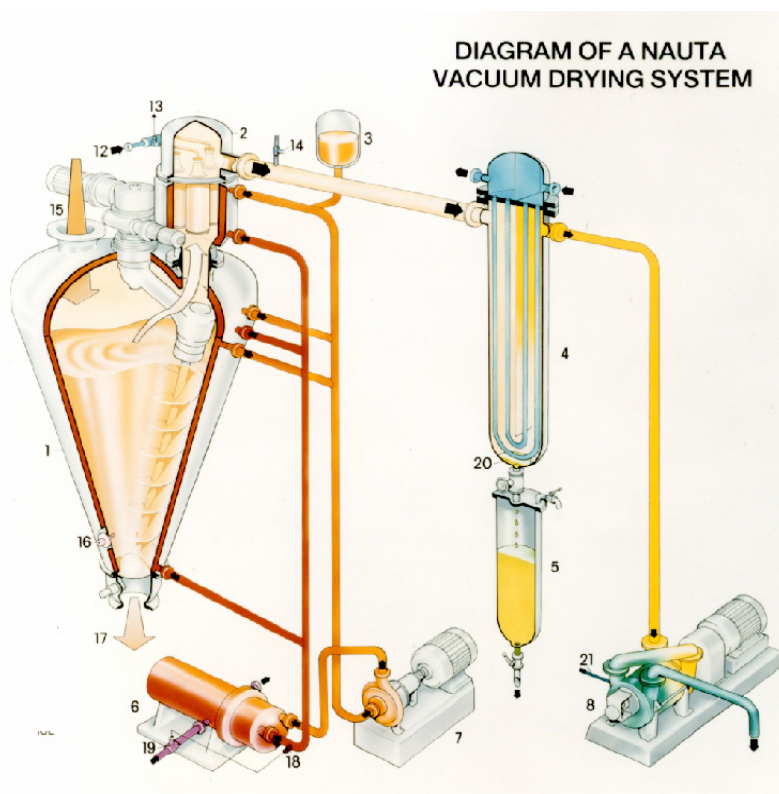
**Process data**

Content of Vacuum Dryer	:	4000 ltrs of product
Feed capacity	:	2000 kg
Feed moisture content	:	30% W.B.
Product moisture content	:	< 0.1% W.B.
Type of moisture	:	Ethanol
Duration of cycle	:	approx 20 hours
Product temperature	:	42 °C
Jacket temperature	:	75°C
Product obtained	:	Free flowing powder without agglomerates

**Process duration**

Process step	Duration in hours	Remarks
Charging of Vacuum Dryer	0,5	By means of containers
Drying under vacuum	14	At 5 mbar and 40°C
Cooling of product	1,5	To below 30°C
Discharging	1,0	Into IBC
CIP Cleaning	1,0	Fully automatic CIP system
Total cycle	18	

**Typical flow sheet of Vacuum Drying System**



**Conclusion**

The Conical Agitated Vacuum Dryer is a **proven** technology for drying temperature sensitive pharmaceuticals containing solvents resulting in a uniform and dry product in one step process.