Vacuum Dryers

Drying is responsible for more than 15% of the energy used in modern industrial processes. This makes energy efficiency a major factor to be considered when designing a vacuum drying system. At Hosokawa Micron, we are expert in the development of such state-of-the-art drying technologies and put a lot of thought into developing systems that save you energy.

When it comes to our vacuum drying systems, we have technology that is capable of handling materials such as wet powders, filter cakes, pastes and slurries, especially those products that are heavy, sticky, heat sensitive; that contain solvents, are toxic or even explosive. Our vacuum dryers are suitable for low vacuum operation and can also be applied to other phases in the process, for example:

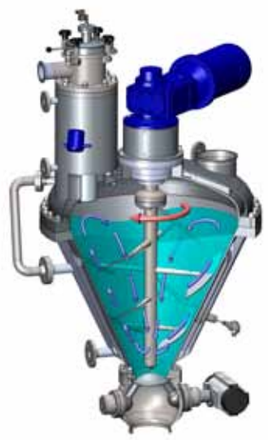
- Reaction/crystallisation
- Heating/cooling
- Sterilisation
- Liquid/solid separation and de-aeration

Our Vrieco-Nauta® conical screw vacuum dryer was one of the first agitated vacuum dryers developed and was designed to replace the vacuum tray dryer. Now we have an even broader range of vacuum drying systems for the treatment of an even wider number of media, from chemicals and metals to pharmaceuticals.

Working principle

1. Heat energy is transferred into the product through a jacketed vessel wall causing solvents or moisture residues to evaporate.
2. A rotating agitator (e.g. screw, ribbon or paddle) transports the product along the vessel wall and helps the vapours to escape to the surface providing a frequent exchange of particles in contact with the heated surface at the same time.
3. A vacuum system keeps the vessel under constant vacuum and removes the vapours from the vessel, having separated dust particles from the vapours in a dust filter on top of the vessel first. The vacuum within the vessel also reduces the saturated vapour pressure of the solvent, facilitating drying at much lower temperatures.
4. For recovery of solvents, a condenser can be installed in combination with a collection vessel. The drying time and the drying process are dependent on heat conduction of the solid particles and solvents, pressure and temperature conditions as well as the speed of the agitator.

Conical Screw dryer



Conical paddle dryer

Vacuum drying Technology

Choosing the right rotor

One of the most important design aspects of a vacuum dryer is its agitator. In order to choose the right agitator with the right characteristics, it is essential to understand what the properties of the feed material are and what you expect from the vacuum drying process.

Screw agitator

The screw agitator is a well-proven design suitable for drying powders, filter cakes, pastes and slurries under atmospheric or vacuum conditions. It is suitable for almost all products even when they are sticky. With its excellent product transportation along the vessel wall, it guarantees an efficient drying cycle and can be applied for dryers with capacities of over 20,000 litres.

Ribbon agitator

When products have low-starting moisture content and good flow, a ribbon agitator can provide an alternative solution to the screw agitator. It can agitate a larger batch at any one time, resulting in better heat transfer and possibly shortening drying time.

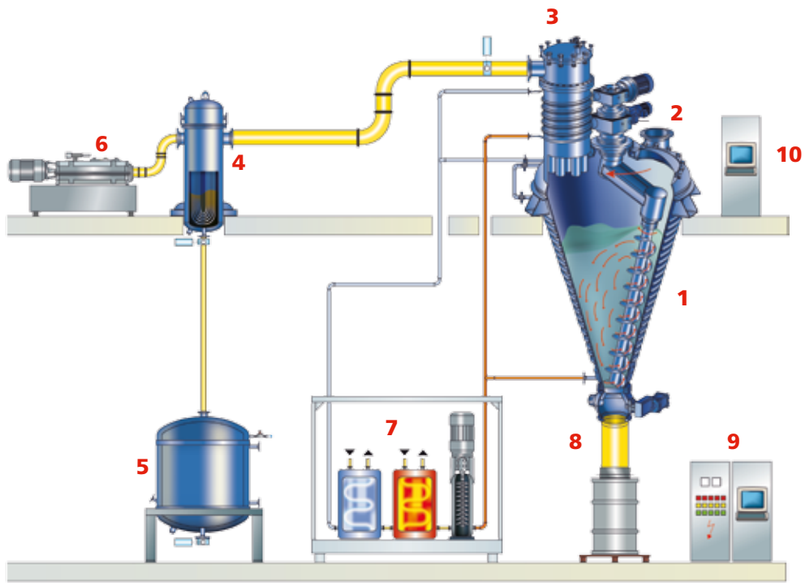
Paddle agitator

When products are not likely to stick, a paddle agitator can be used to provide optimal temperature control and to transport product between the rotor tip and the vessel wall. When required, it can also be used to mix the products intensively after the drying cycle.

Screw agitator

Ribbon agitator

Paddle agitator



1 Vacuum dryer
2 Product in
3 Vacuum filter
4 Condenser
5 Receptacle
6 Vacuum pump
7 Heating/cooling skid
8 Product out
9 Control Cabinet
10 Operating Panel

Vacuum drying installation with one condensation step