



# Atlas

## Dry Condensing

An Energy-Saving  
Process  
For Low Pressure  
Vapor Removal

The basic principle of modern dry condensing is to capture all the low pressure, condensable vapors generated in a given process by freezing them on cold surfaces at the full process vacuum. By employing this principle it is unnecessary to compress the vapors to atmospheric pressure for condensation at ordinary cooling water temperatures, thus vastly reducing energy consumption.

In processes where steam must be removed at pressures below 5 torr, the task has traditionally been performed by the use of high-pressure steam ejectors backed by a barometric water condenser. This practice has two drawbacks; very high energy consumption because steam ejectors use much more steam than they remove and generation of large quantities of contaminated condensate.

Niro's Atlas group is a world wide leader in freeze-drying equipment. Condensing under high vacuum is a vital part of modern freeze dryers. The condensing know-how for freeze drying is the basis for the development of dry condensing.

**Dry condensing is ideal for processes operating under vacuum in such industries as:**

- Fatty acid distillation/fractionation
- Fatty acid derivatives
- Edible oil deodorization
- Chemical/petro-chemical
- Freeze-dryers including retrofits

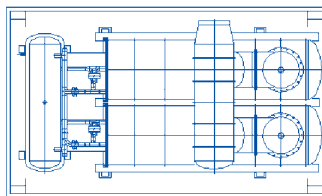
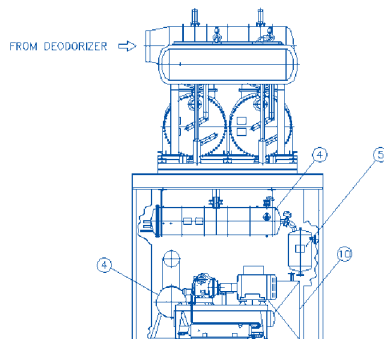
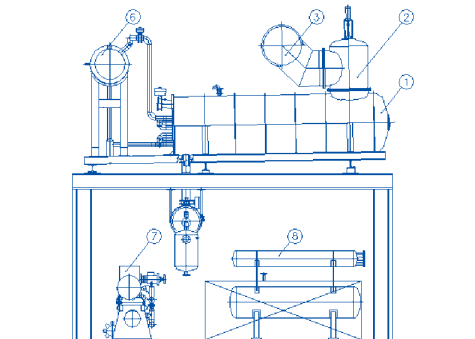
**The main elements of the dry condensing plants are:**

- Vapor trap system
- De-icing system
- Non-condensable vacuum system
- Refrigeration plant

In operation, the water vapor from the vacuum process condenses on the cold surfaces of a continuously regenerated vapor trap. The vapor trap consists of multiple condensers which are sub-cooled by evaporation of ammonia. The vapors from the process will condense as ice on the cold surfaces in the condensers. The condensers are isolated in turn for de-icing. De-icing of each condenser is performed under vacuum by means of warm vapors from the de-icing vessel. Non-condensable gases are removed by means of a mechanical vacuum pumping system or a very small steam jet ejector. Operation is continuous and controlled by a PLC or the customer's DCS.

**Advantages of the Atlas dry condensing plant:**

- Low energy consumption: The energy usage is only 10-20% of traditional steam ejector systems.
- Reduced steam load: No motive steam is used, freeing boiler capacity.
- Reduced pollution: Volatile material carried over from the process is contained in the small volume of water condensed from the process steam, thus allowing easy separation. There is no additional condensate from motive steam.
- Low water consumption: Total water consumption is reduced to one tenth of a percent of the of steam ejector systems.



POS.	EQUIPMENT
1	DRY CONDENSER
2	PROCESS VALVE
3	COLLECTING PIPE
4	DE-ICING VESSEL
5	EMPTYING VESSEL
6	AMMONIA LIQUID SEPARATOR
7	AMMONIA COMPRESSOR
8	AMMONIA CONDENSER
9	AMMONIA RECEIVER
10	VACUUM PUMPS

Typical 2 module dry condensing plant

Atlas dry condensing systems has been installed in more than 40 plants in 20 countries worldwide, reducing energy costs and waterborne emissions.

