

PROCESS

DRYER - ATOMISING TOWER

Description

A much applied type of dryer, in origin especially for milk powder, but nowadays also for a number of other products, the atomising tower is also called spray dryer or powder tower.

The tower works on the following principle: the product that has to be dried is, as a fine mist, together with hot air, injected at the top of the tower. Because of the hot air the liquid evaporates and dry powder is left behind at the bottom of the tower. Mostly the air is evacuated on the side into a cyclone or a filter.

The dryer is only suitable for liquids that can be atomised. This atomising is done either by using spray nozzles or as the product falls on a very fast turning disc and is flung away.

Mixtures

At the bottom of the tower, where the air is separated from the product, there is nearly always an explosive mixture. At the top of the tower this has to be worked out case by case, dependant on the proportion air/product in the tower.

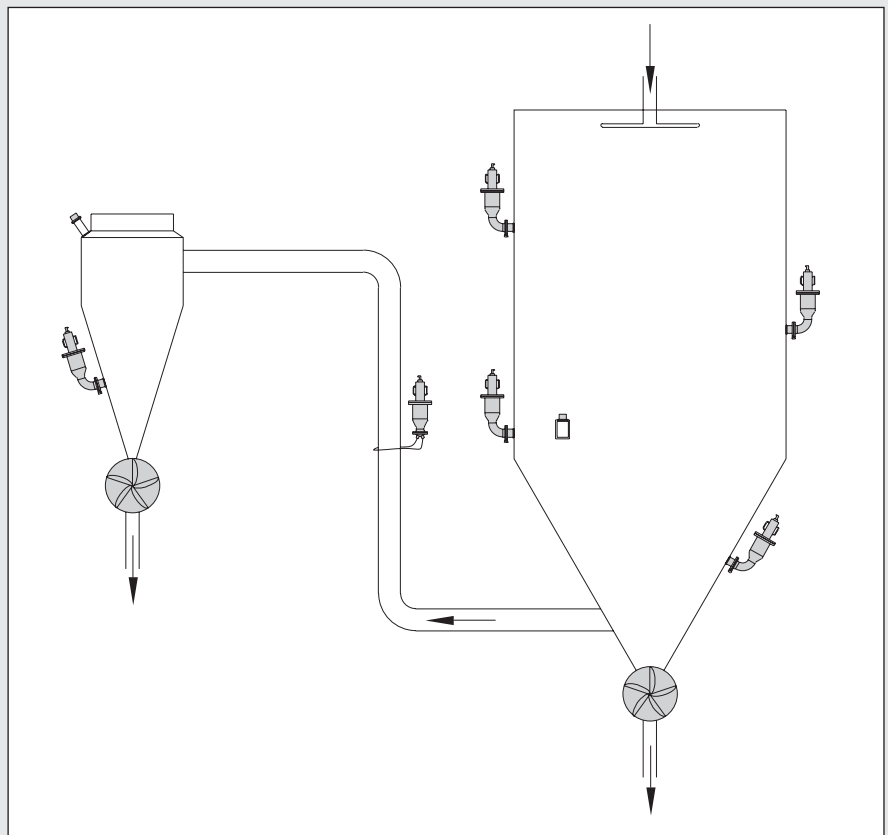
Ignition sources

The most common ignition sources are:

- ▶ **The atomiser disc** : this disc can become overheated or even break and hit the wall of the dryer with high speed.
- ▶ **Product deposits at the spray nozzles** that, as a consequence of the high temperature, start smouldering.
- ▶ **Auto ignition** in deposits at the walls.

Protection

As preventive measures are appropriate mainly vibration monitoring on the rotating disc and CO detection, if the product is sensitive to auto ignition and, in that case, produces sufficient CO. In the case of alarm the installation is not stopped immediately, as this could lead to very high temperatures, but is switched over to water injection (instead of the product to dry). Nevertheless constructive protection remains necessary.



As, in general, very large volumes are involved, pressure resistant construction is no real option. In most cases either explosion venting with one or more explosion doors or bursting discs in the side wall, or explosion suppression are applied. Dependant on the risk analysis either the whole volume of the dryer must be taken into account or the lower part only.

The various in- and outlets must also be taken into account:

- ▶ **The product inlet:** as wet product is involved that is, under high pressure, forced through a narrow opening, normally no isolation is necessary.
- ▶ **The air outlet:** here explosion propagation towards the cyclone or the filter is certainly possible. As the ducts concerned are mostly large in diameter, the best solution here is a chemical barrier.
- ▶ **The product outlet:** in those cases where the outlet is equipped with an explosion proof rotary valve or if a permanent presence of sufficient product in the outlet can be guaranteed so that explosion propagation becomes impossible, no supplementary protection is necessary. If this is not the case, a chemical barrier would also be the best solution here.