

Vacuum low temperature solid continuous dryer

General description:

Low temperature vacuum solid multi-layer belt dryer is a kind of vacuum belt type drying equipment which is fully closed and continuous feeding and discharging. Applicable to all kinds of solid, crystalline, granules, powder, pills, fruit and other raw materials.

Working principle:

The equipment is a vacuum chamber, with a material conveyor belt PTFE (Teflon) arranged inside. Through the vacuum continuous distributor at the top of the equipment, the material is continuously distributed onto the conveyance belt. According to the characteristics of the material, the material distribution thickness can be adjusted (3mm~30mm). The conveyor belt will continue to convey slowly to the other end of the conveyor, and below the conveyor belt is heating zone supplying heat energy to the conveyor belt. During the transmission process, the water in the material on the conveyor belt evaporates continuously, and the steam is quickly pumped by a vacuum pump. When the material arrives to one end of the conveyor belt, it falls by itself down to the second layer. Therefore such a drying process is repeated until the material is dried to reach the drying requirements.

According to the size of the customer's capacity and process requirements, multi-layer conveyor belt in the vacuum container is designed and arranged. Through the continuous solid feeder and a material distributing device, in vacuum conditions the raw materials that needs to dry continuously is fed, customers realizes the continuous feeding and uniform distribution onto the dryer belt. Due to the material is constantly being stirred up in the drying process unceasingly as to speed up the evaporation rate and time, and at the same time the products uniformity in the drying process is ensured. The drying temperature for each conveyor belt can be adjusted from 20°C to 180°C, besides the conveyance speed can also be adjusted, thus it can be adaptive to drying curve for any material, achieving a moderate drying. The discharge start time can be adjusted within 20 minutes to 90 minutes after the material enters the dryer.

Finally at the discharging end, the material falls into the conveying groove, and is transported by the screw conveyor to outlet. If the dried product need grinding process, then it can be crushed under vacuum conditions, avoiding dust flying, increasing product yield and solving the pollution problems. After being crushed screened, the mesh number of the product can be adjusted between 20meshes-200meshes, and at last the product is conveyed to the material collection barrel, until this process, the continuous discharge and drying accomplish, and the production will transit to down stream processes like packaging stage and etc..

Besides, for the dried product, continuous product discharge can be achieved through the vacuum continuous discharging device and vacuum material collector. At the same time, the recovery of organic solvent can be realized, which can solve the problem of environmental protection and increase the yield of solvent recovery.

Shortcomings of traditional dryer.

Low temperature continuous vacuum dryer is a new concept of high efficiency and energy saving type drying equipment, which has been successfully developed after repeated comparison of the advantages and disadvantages of conventional spray drying and freeze drying.

In drying course for the products such as in traditional Chinese medicine, western medicine, chemical, food, health care products and other industries, spray drying is beneficial to cost, but there is a great defect in the solubility of the product, the original favor and the shape of the powder, and it can do nothing to the products which has a slightly higher viscosity and the heat sensitive products. Conventional freeze drying can get product with an excellent solubility and high quality, but the yield is too low, and the cost is too high.

Characteristics and advantages of low temperature continuous vacuum dryer

Low-temperature continuous vacuum dryer process indexes just somewhere between the two devices between, both to ensure that there is no change to the material's original natures, such as heat sensitivity, solubility, original flavor, fragrance and etc. Besides the shape-formation is good, which can realize that the dried products is porous and loose inside, maintaining the original material natures and a good appearance. Due to it is low temperature and vacuum drying, so it can meet the processing requirements of the most sensitive material, and is widely used in biological, pharmaceutical, food, chemical industry. The equipment has the features such as energy saving, low temperature, high productivity, stable performance, safe and reliable.

The low temperature continuous vacuum dryer breaks through the technically difficult problem of the continuous feeding and discharging under the vacuum state, which turns the static drying into dynamic drying successfully, realizing continuous feeding, discharging and shaping through crushing in vacuum state and avoiding two times of pollution and the oxidation-reduction of the oxidizable materials. The entire production process achieves a fully closed production, which is pipelined, automatic, continuous, thus the yield of dry powder reaches more than 99%, and the solvent recovery rate is more than 90%. Because the man-machine interface operation management system has been realized, the output of the dry product is greatly improved, and the production cost is reduced. At the same time, whether the equipment or the entire production process is in strict compliance with national GMP and environmental protection requirements, achieving the the "high efficiency, energy saving, green, environmental protection" in the national "12th Five-Year-Plan".

Low temperature continuous vacuum dryer is especially suitable for the drying of the material with high viscosity, high fat, high sugar, which is too difficult to be solved for spray dryer and vacuum drying oven. And it can keep the stability and consistency of product batch.

Technical features:

1. In the vacuum state to achieve continuous feeding and discharging, feeding amount can be set freely according to needs.
2. The heating system using steam, hot water and electrical heating transferred to thermal oil heating and other forms.
3. The drying temperature can be adjusted from 20°C to 180°C ,and in 20 minutes to 90 minutes it starts to discharge material continuously until the completion of the batch production.
4. The track is made of Teflon material, stable operation, reliable and uniform heating area.Track speed can be adjusted, and the number of layers of 2 to 10 layers,determined according to the user's production requirements.
5. Using a variety of material-distribution device, which can adapt to the drying for the liquid, extract, powder and granular material etc..
- 6.Equipped with automatic grinding system under vacuum conditions, mesh number for dry particle can be chosen according to the requirements of the user.
7. With CIP cleaning system, automatic cleaning, it is fast and convenient.
8. Selection of high quality vacuum unit and carefully designed and combined, with continuous high capacity of pumping rate and stable vacuum.
9. Low energy consumption, no three wastes, low noise.
10. Fully comply with the requirements of GMP certification.

Major advantages:

A full set of process is automatic, pipelined, continuous, programmed.

Complete the drying process in vacuum under low temperature, no nature change to heat sensitive materials, no chance of contamination.

Suitable for the drying of all kinds of highly difficult materials. High viscosity materials do not stick to the belt(Teflon PTFE for the conveyance belt), and shape of crystal material is not damaged aft being dried.

Material dryness (moisture content) can be adjusted.

Energy consumption is only 1/3 of a centrifugal spray dryer for the same output, and 1/6 of freeze dryer.

The moisture content of the product can be optimized and combined with the main parameters such as temperature, vacuum degree and speed of the drying process, so that the work utilization rate of equipment can achieve the best economic benefit.

Using PLC touch screen automatic programming operation and control system, and configured with continuous protection device. High degree of automation can greatly reduce the cost of labor force operation.

This machine is reasonable in design, compact in structure, convenient in installation and commissioning, and is suitable for installation under most working conditions.

Suitable for large batch, continuous, automatic operation.

Contrast with similar traditional dryer

Item	Vacuum low temperature belt dryer	Freeze dryer	Vacuum drying oven	Spray dryer
Drying temperature	Low , Medium temperature	low temperature	Medium ,high temperature	High temperature
Drying time	30-60 minutes	20-35 hours	10-20 hours	fast
Product solubility	excellent	excellent	averagely	averagely
Product quality	excellent	excellent	averagely	averagely
Material storage	good	good	averagely	averagely
Operation cost	low	high	medium	high
Plant investment	medium	high	low	low
Application scope	widely	averagely	widely	narrowly
Continuous production	yes	no	no	yes

Technical Specs.

Model	Diameter mm	Length mm	Height mm	Heating area m2	Drying Temp. ℃	Feed moisture level %	Moisture level in dry material %	Water evaporation Kg/h	Supporting heating resource	Main set power kw
ZD 15-3	1400	7500	3000	15	20-150	20-80	0.3-5	8-12	Steam / hot water /hot oil	6.00
ZD 35-5	1600	9800	3300	35				18-25		8.00
ZD 50-5	2200	11500	3800	50				25-35		12.00
ZD 70-5	2200	13500	3800	70				35-45		12.00
ZD 80-5	2200	15500	3800	80				40-60		12.00
ZD 120-7	2300	16000	4200	120				70-90		15.00
ZD 160-9	2500	16000	4500	160				90-120		17.00
ZD 220-11	2800	16000	4500	220				120-150		19.00

Notes: If the solvent is organic solvent (ethanol, acetone, methanol, etc.), the evaporation of equipment will be greatly improved.

The evaporation rate is closely related to the temperature of the drying process.

Scope of application

Traditional Chinese medicine, western medicine, food-stuff, chemical and other industries;

Solid, crystalline, granules, powder, pills, fruit and other raw materials;

Oxidizable materials, explosive, strongly irritative, highly toxic materials;

Products demanding to recover all kinds of solvent.

The reference to some of the physical photos of vacuum low temperature solid belt dryer

