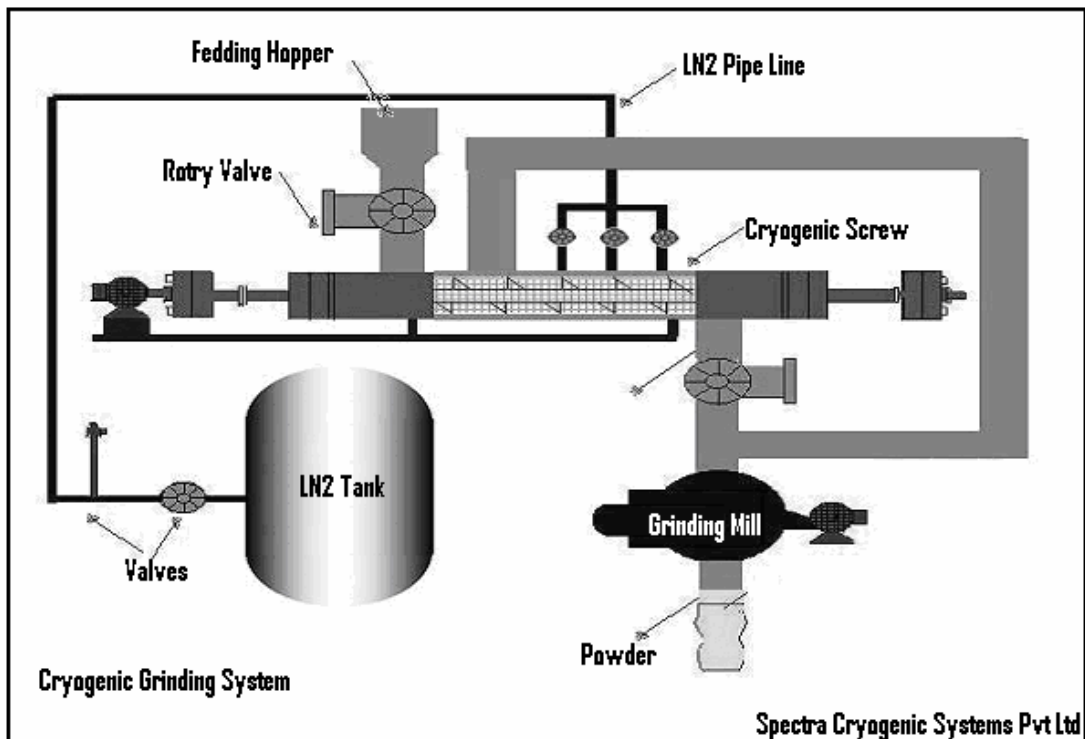


Cryogenic Grinding System for Spices & Herbs



Spectra Cryogenic Systems Private Limited (Cryogenic equipment manufacturers and consultants)

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Introduction:

Cryogenic size reduction (grinding) of spices is an acceptable technique that helps to retain the natural quality of spices. Use of liquid nitrogen provides the required low temperature so that volatile components and essential oils content which preserve the spice flavor retains during grinding process.

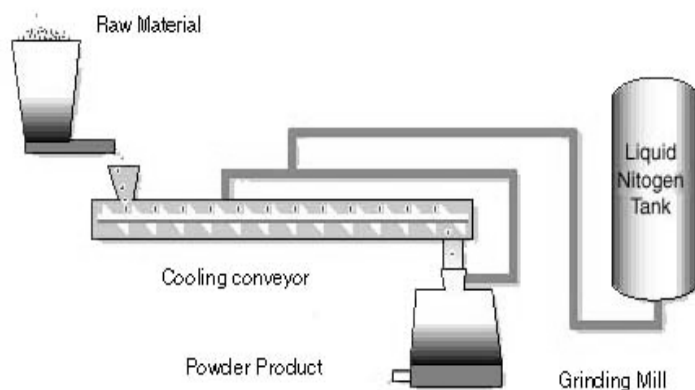
Definition:

Cryogenic grinding of spices is a method of powdering spices/herbs at sub zero temperatures ranging from 0 to minus 196 0C.the spices are frozen with liquid nitrogen, as they are being ground. This process does not damage or alter the chemical composition of the spices in any way. Normal grinding process which does not use a cooling system can reach up to 200 °C temp. This high temperature can reduce volatile components and heat sensitive constituents in spices.

The Process:

The material is feed into a feeder hopper and dropped into a conveyor when the material to be processed enters the pre-chilled conveyor; liquid nitrogen is sprayed and blended directly onto the material. The material is conveyed via a stainless steel special design auger. The auger not only transports the grinding media, but also mixes with liquid nitrogen for greater cooling efficiencies.

The liquid nitrogen, a cryogenic fluid with a boiling temperature of $-196\text{ }^{\circ}\text{C}$ absorbs heat from the material and vaporized to a gaseous state. The nitrogen gas exits the system conveying the process heat away from the process



Liquid nitrogen is added until the temperature of the material is reduced to a predetermined set point. This set point is the glass transition temperature of the material finally the brittle material enters an impact (pin) mill where it is ground to a desired particle size. Computer controls the entire process of cryogenic grinding system.

Traditional Grinding / Cryogenic Grinding

| Disadvantages of Existing Grinding System | Advantages of cryogenic Grinding System |
|--|--|
| The heat is developed inside the grinding mill | Temperature below 0 0C inside the grinding mill |
| This heat, which developed during grinding, leads on the one hand to evaporation of the essential oils and on the other hand, heat-sensitive fats are melted. This is turn can lead to the grinding elements become grassy (oily) and clogged or even to machine blockages | Minimal loss of volatile components |
| High energy consumption | Low energy consumption |
| Low throughput | High throughput |
| Existing grinding equipments more than two times recycle into the mill for required particle size. | Approx. 2 - 3 times higher grinding capacity |
| Fire Risk | No Fire Risk |
| High capacity motors are required to grind the material | Low capacity motors are required to grind the material |
| Air pollution due to evaporating essential oil into the atmosphere | No, evaporation of essential oil into the atmosphere |
| No control on particle size | Particle size under control |

Benefits of Cryogenic Grinding:

- Ø Increased throughput
- Ø Low capacity motors required
- Ø Reduced power consumption
- Ø Smaller size particles
- Ø Minimal loss of volatile components
- Ø Improves the aroma by minimizing the loss of essential oils when compared with grinding at normal temperature
- Ø Approx. 2 - 3 times higher grinding capacity
- Ø Eliminates fire risks

Consumption in kg of LN2 per kg of material

Consumption dependent on spice and fineness approx. 0.6 - 0.8 kg LN2/kg product

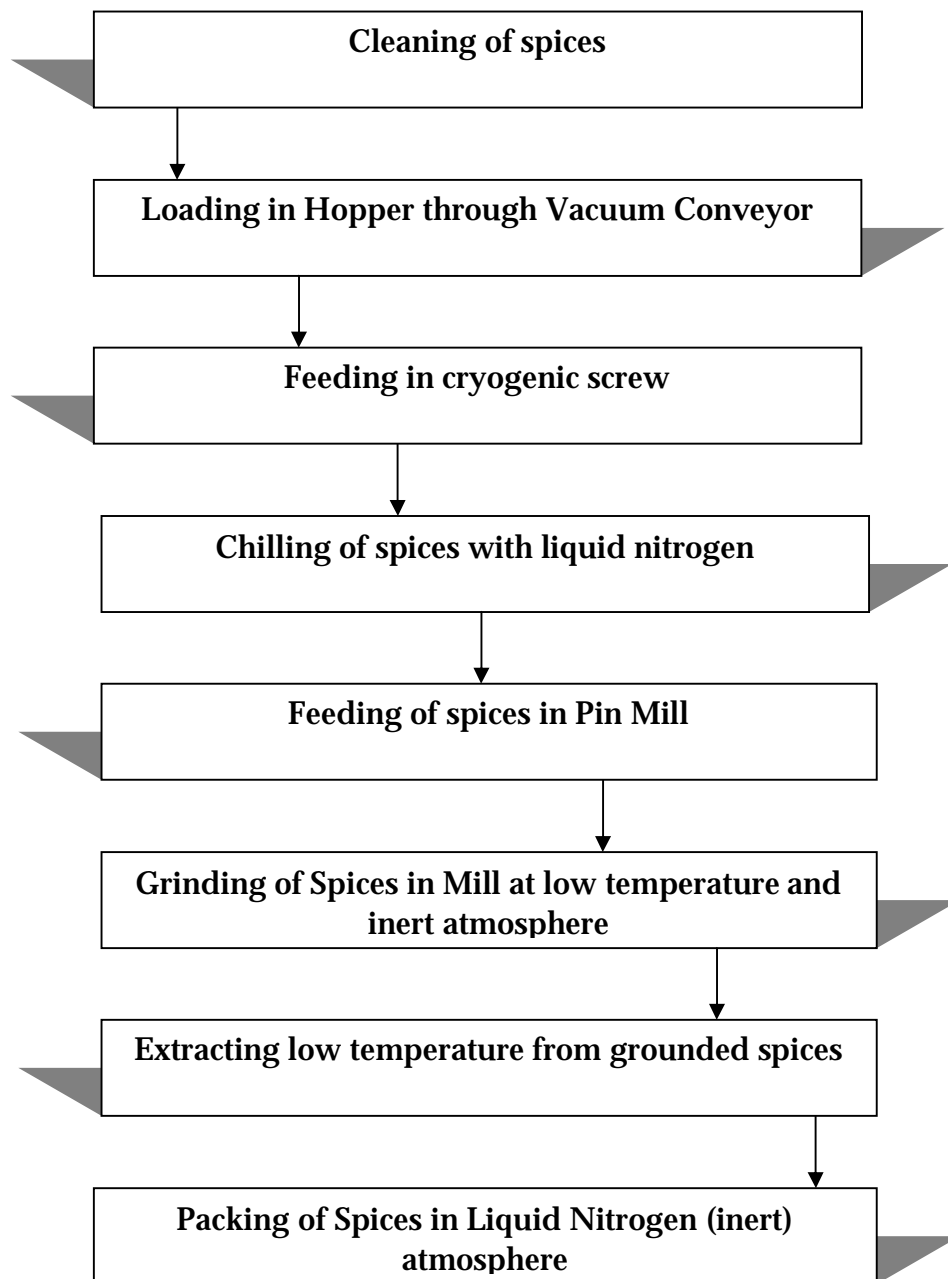
Pin Mill

Pin mills are high-speed machines working without screen, Pin rows, concentrically fixed on rotor and stator discs, crush the particles, interchangeable pins in different sizes can be delivered. According to the size reduction problem, the concentrically spaces between the pins can be adapted to the material.

Consumption of Electricity:

Approximately 10-15 H.P power connection required to grind 150-200Kg/hr Product.

PROCESS FLOW CHART



Limits of Cryogenic Grinding

We at Spectra Cryogenic Systems Pvt. Ltd recommend that you discuss your grinding requirement with one of our specialists before selecting any Grinding System. If there is any question about whether a material can be ground in a cryogenic system we will request that a portion be submitted for test-grinding.

Welcome in cryogenic globe!!

Fly by quality wings

For any further information kindly contact us:

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