

## **COMPLEX DRYING VACUUM-PULSED**

The vacuum impulse drying method is innovative and is a drying with variable operating parameters, which avoids excessive heating and overdrying of the surface layers of the product, while maintaining the appearance and natural taste of various pastes, extracts, fruits, vegetables, fish, meat, cheese, their useful properties, nutritional and biological value. Drying using a chamber with this method is universal, allows you to get a wide range of products, including dry powders.

The developed technology of innovative drying processes is based on the world experience presented in leading foreign publications: Drying Technology, Food Drying Science and Technology, Drying Technologies in Food Processing etc.

### **BRIEF DESCRIPTION OF TECHNOLOGY (BY THE EXAMPLE OF PROCESSING RAW FRUIT AND BERRY)**

The technological process of drying fruit and berry raw materials includes the following main operations:

1. Preparation of raw materials. Incoming raw materials are subjected to removal of mechanical impurities, washing, inspection and cutting/grinding. Cutting options can be completely different: cubes, slices and rings for chips, slices, straws, etc. at the request of the customer.

2. Drying in a special drying complex. You can also dry the cake, peel and core (amniotic fluid), obtained by peeling and cutting fruits, as well as juices, thick extracts, cheese, honey.

3. Unloading of finished products and packaging.

The use of vacuum impulse drying, combined with convective drying and vacuum steam modes in one chamber, allows the drying process to be carried out with a reduction in time by several times while maintaining the original quality, this is especially noticeable when drying dense products with an undeveloped surface (pieces, slices).

This type of drying avoids the problems of product deterioration such as shrinkage, reduced rehydration capacity, loss of taste, aroma and color, loss of nutritional value, and the need for blanching of products.

**During the process, the product does not oxidize, the drying time is reduced, and the quality of the product is improved.**

The process is comparable to freeze-drying, but has a simpler hardware design, and is cost-effective in tonnage production. Dry products obtained using innovative technology are a serious competitor in terms of price and quality to products obtained by the classical drying method.

When completing the equipment, it is possible to optionally use a mixture of nitrogen and carbon dioxide as a working agent, this makes it possible to obtain products of the highest quality from fresh raw materials, superior to sublimation ones.

## **KEY BENEFITS**

### **Equipment advantages:**

- low specific energy consumption per 1 kg of evaporated moisture;
- energy consumption of about 1 kWh/kg of the finished product (two times less than any dryers);
- drying of products is carried out at a low temperature - +30°C ... +45°C;
- drying of products is carried out at a high speed;
- reliability and high payback.

### **Dried Food Benefits:**

- shelf life of dried products from 2 years without the use of additional preservatives with the use of barrier materials;
- the dried product is lighter and more transportable;
- storage conditions at any minus temperature up to + 20 °C;
- the dried product has a high energy value due to the concentration of carbohydrates, proteins and other valuable nutrients, the quality of which is practically unchanged during storage.

### **Technology advantages:**

- universal to processed raw materials;
- assortment - more than 50 items of plant raw materials.

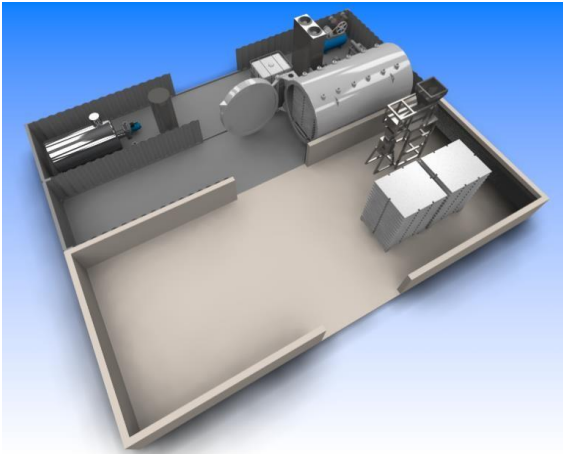
## TECHNICAL AND COMMERCIAL OFFER

The vacuum-impulse drying complex can be manufactured with different capacities (2.5 tons, 5 tons and 10 tons per day), and can be made in *mobile* and stationary form. Type of drying chamber:



### Description and characteristics of the complex with a capacity of 2.5 tons of raw materials per day

Platform/container (mobile) and overall dimensions 12m\*10m:



The complex has 3 sites and occupies 90 m<sup>2</sup> of production area:

1. Drying area 2.5 x 12.0 m - 30 m<sup>2</sup>;
2. Packing area 2.5 x 12.0 m - 30 m<sup>2</sup>;
3. Power unit 2.5 x 12.0 m - 30 m<sup>2</sup>

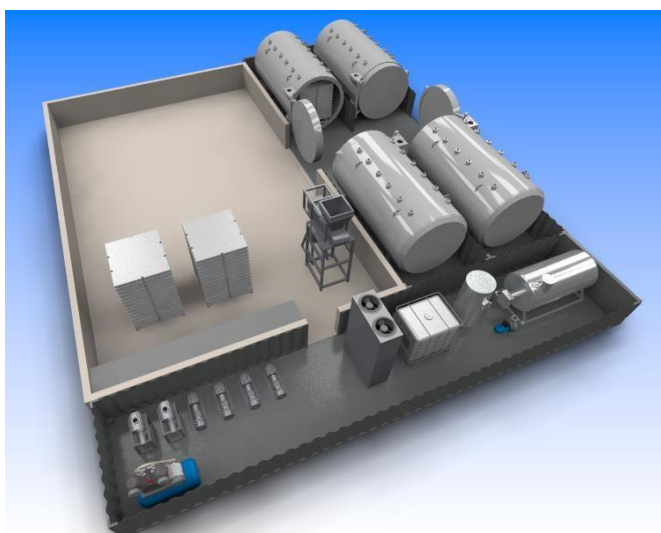
Table 1 - Technical characteristics of the complex 2.5 tons

Raw material capacity	2,5 t/day
Installed electric power, total	92 kW

including:	
Drying section	12 kW
Finished product packaging area	3 kW
Power unit	77 kW
Consumed electrical power, peak	70 kW
Thermal steam generator power, not less than	240 kW
Pressure in the cold water line, not less than	0,15 MPa
Cooling water consumption (at $t \leq 10^{\circ}\text{C}$ ), no more than	4 m <sup>3</sup> /h

### **Description and characteristics of the complex with a capacity of 10 tons of raw materials per day**

**Platform / container (mobile) and overall dimensions 14.65m \* 12.3m:**



The complex has 3 sites and occupies 192 m<sup>2</sup> of production area:

1. Drying area 5 x 12.0 m - 60 m<sup>2</sup>;
2. Packing area 7 x 12.0 m - 84 m<sup>2</sup>;
3. Power unit 3 x 12.0 m - 48 m<sup>2</sup>.

Table 2 - Technical characteristics of the complex 10 tons

<b>Raw material capacity</b>	<b>10 t/day</b>
Installed electric power, total	150 kW
including:	
Drying section	48 kW
Finished product packaging area	6 kW
Power unit	96 kW
Consumed electrical power, peak	100 kW

Thermal steam generator power, not less than	400 kW
Pressure in the cold water line, not less than	0,15 MPa
Cooling water consumption (at $t \leq 10^{\circ}\text{C}$ ), no more than	4 m <sup>3</sup> /h

### CONTENTS OF DELIVERY\*

No	Name	Quantity, pcs.	
		2,5t	10t
1	Drying chamber	1	4
2	Rack	4	12
3	Shelving trolley	4	12
4	Polypropylene tray 400x600mm (20 trays per box)	480	1440
5	Solid propellant steam generator 600kg/h, 0.7MPa, +160C 10-100% automatic fuel supply, automatic performance adjustment included	1	1
6	Chiller (cooling capacity 100 kW)	1	1
7	Vacuum pump, 3.3 m <sup>3</sup> /min, 7.5 kW	2	4
8	Vacuum pump, 150l/s, 4 kW	1	2
9	Compressor 630 l/min, 10 kgf/cm <sup>2</sup> , 5.5 kW	1	1
10	Capacity account refrigerant, V=500 l	1	1
11	Centrifugal pump, refrigerant, 8m <sup>3</sup> /h	1	1
12	Condensate collector, 100l	1	2
13	Centrifugal pump, condensate, 380V, 3m <sup>3</sup> /h	1	2
14	Buffer condensate tank 50l	1	2
15	Rotary pump, 14l/min	1	2
16	Condensate collector tank 50 l stainless steel	1	4
17	Rotary pump, 14l/min	1	4
18	Capacity juice collector 100 l stainless steel	1	4
19	Packing machine	1	1
20	Set of valves and other stop valves	1	1
21	Piping kit	1	1
22	Pneumatic kit	1	1
23	A set of instrumentation and automation	1	1
24	Camera control cabinet with operator panel	1	2
25	Vacuum pump control cabinet	1	2
26	Set of electrical cables	1	1
<b>TOTAL cost of equipment, mln. \$ EXW</b>		<b>1,9</b>	<b>4,9</b>

\* The site for the preparation of raw materials is agreed depending on the type of raw materials  
 Production time - 6 months. Start-up and adjustment works - 1 month. Warranty - 1 year.

Installation, commissioning and technological support - the cost is determined separately.

