

nitrogen plants  
in the food  
industry

economically  
viable solution



# APPLICATIONS



## We will share your success!

GRASYS, the Russia and CIS leader in manufacture of modern gas production systems, is pleased to offer you its on-site nitrogen production plants. Developed with the use of the most recent technologies in the field of membrane and adsorption gas separation, GRASYS nitrogen plants allow significantly extending products shelf life.

Over recent years, there has been an increasingly growing number of consumers in Russia who prefer to buy quality food staff. Following this trend, more and more companies tend to use nitrogen plants for food staff storage, transfer and packing in inert environment. Among our clients are the largest Russian companies producing a wide range of food products: Mars Corporation, Wimm-Bill-Dann Corporation, EFCO Group of Companies, Ore-Irastmaslo OJSC, Fat Combine, OJSC (Saratov), Yantarnoye, CJSC (Aktarsk, Saratov region), Lebedyansky, OJSC (Lebedyan', Lipetsk region), Progress, OJSC (Lipetsk), Moscow Nut Company, CJSC and others.

## Food staff storage, transfer and packing

The use of modified – inert gas – environment in food production allows multiply increasing products shelf life, while preserving their attractive appearance and enhancing flavor properties. The adoption of GRASYS plants producing inert gas of nitrogen from air makes it possible to preserve products from oxidation, moulding, and microorganisms and pests propagation.

In the food production, modified environment is widely used by a large number of companies for storage and packing of such products as butter, cheese, juice, beverage, yogurts, coffee, nuts, potato chips and others.

## Regulated environment in storage facilities

The application of gas medium control systems in storage facilities for agricultural products allows a multiple increase in vegetable and fruit storage period.

Tests conducted at the experimental horticultural base, showed a very high efficiency of GRASYS nitrogen plants in comparison with conventional refrigeration systems and propane combustion based systems in the removal of oxygen from atmosphere.

**Typical indicators of storage period extension with the adoption of GRASYS systems**

	Period before noticeable physical deterioration and changes in color, texture, or sugar content																				
	1 week	2 weeks	3 weeks	4 weeks	5 weeks	6 weeks	7 weeks	8 weeks	9 weeks	10 weeks	11 weeks	12 weeks	13 weeks	14 weeks	15 weeks	16 weeks	17 weeks	18 weeks	19 weeks	20+ weeks	
<b>Horticultural products</b>																					
Apples																				28 weeks	
Bananas																					
Cabbage																					
Kiwis																					
Lemons																					
Pears																					28 weeks
Peaches																					
Pineapples																					
Tomatoes																					
<b>Convenience foods</b>																					
Sausages and sausage rolls																					
Processed meat																					
Pizza																					
Hard cheese																					
Yogurt																					
Coffee																					24 weeks
Milk powder																					52 weeks
Nuts																					52 weeks
Chips																					52 weeks

Conventional refrigeration systems
  GRASYS systems



## Our knowledge to your prosperity

The use of GRASYS plants specially developed for the purposes of food staff storage and final products packing in inert environment, as well as for generation of controlled environment in vegetable stores, allows avoiding a number of problems.

### Oxidation

Oxidants, specifically oxygen, primarily affect unsaturated fat acids with the resulting odor and unpleasant taste developed, in particular, by such products as butter, margarine, nuts, and potato chips. By products storage and packing in inert environment, the oxidation process may be retarded multiply.

### Moulding

Mould is one of main products deteriorating organisms. Filling of packages with high purity nitrogen (98-99.99%) helps effectively prevent mould growth.

### Microorganisms propagation

Propagation of microorganisms, primarily bacteria, makes food poisonous. This process may be stopped or retarded by filling of packages with a mixture of nitrogen and carbon dioxide.

### Harmful insects

Inert atmosphere protects from harmful insects, as it is killing for most of them.



GRASYS is the only Russian commercial producer of gas separation plants incorporating state-of-the-art technologies of membrane and adsorption separation. The combination of the latest scientific developments with wide experience of company specialists secures a number of objective advantages delivered by GRASYS plants.

### Economic efficiency

Nitrogen generated by plants is 10 to 20 times cheaper than purchased cylinder or liquid nitrogen.

### Reliability

Nitrogen plants have no moving parts except for highly reliable valves, which ensures long-term trouble-free equipment operation.

### Adjustability

Nitrogen plants allow easy adjustment of nitrogen purity (up to 99.99%) and production capacity (up to 5,000 nm<sup>3</sup>/hr). There is no necessity in nitrogen dilution with oxygen because of nitrogen high purity.

### Convenience

GRASYS nitrogen plants are highly automated, with the plant start and stop procedures taking just a few minutes.

## Operating principle

The manufacture of GRASYS nitrogen plants is based on two modern technologies of nitrogen production from air – membrane and adsorption ones. Each of these technologies has been highly recognized in the developed economies for several decades.

The operating principle of the membrane nitrogen plants is based on the difference in velocity with which nitrogen and oxygen penetrate polymer hollow membranes driven by drop in partial pressures on membrane sides. Structurally, membrane fibers are specifically configured representing a cylindrical cartridge with two end faces with bundled fiber yields.

The basis of the adsorption air separation is formed by the principle of certain air components fixation by a special substance, adsorbent, depending on their temperature and partial pressure. Oxygen is easily taken in by adsorbent, while nitrogen goes freely through the plant and is delivered to consumer.





## GRASYS products:

Nitrogen plants and stations

**Membrane nitrogen plants\***

**Adsorption nitrogen plants\***

Cryogenic nitrogen plants

Mobile nitrogen stations

Self-propelled nitrogen compressor stations

Oxygen plants and stations

Membrane oxygen plants

Adsorption oxygen plants

Cryogenic oxygen plants

Mobile oxygen plants

Cryogenic plants for nitrogen, oxygen and argon production

Nitrogen fire-fighting units

Hydrogen plants

Membrane hydrogen plants

Adsorption hydrogen plants

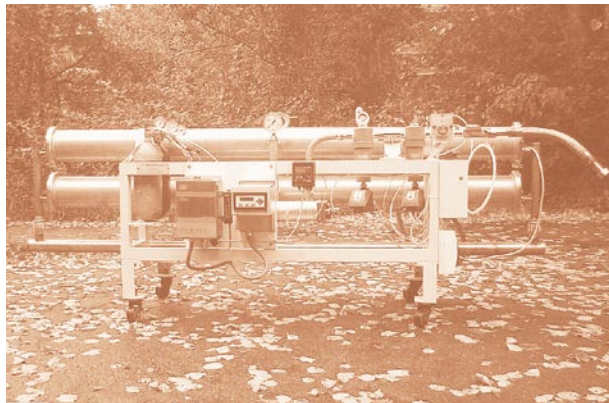
Hydrocarbon plants

Compressor facilities

Air and nitrogen compressors

Gas compressors

**\* Products described in this booklet**



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