

Food, Beverage & Pharmaceutical Applications



Oxymat at a Glance

Oxymat is a Denmark based company specialized in designing and manufacturing on-site Oxygen and Nitrogen solutions, using Pressure Swing Adsorption (PSA) Technology. We have been designing, engineering and manufacturing Oxygen generator systems since 1978 and nitrogen systems since 2001. We possess first hand knowledge of the market, development, demands and possibilities the PSA technology holds. It is our mission to be your preferred innovative, dynamic and environmentally responsible supplier of on-site oxygen and nitrogen solutions worldwide.

Our team of more than 80 skilled and dedicated employees is based in 4 different locations:

- Denmark: Administration, Sales and Service
- Slovakia: Administration, R&D, Production, Project management, Sales and Service
- China: Administration, Sales and Service
- Colombia: Sales and Service

With more than 20 engineers (project managers, 3D CAD designers, automation engineers and experienced sales engineers) making sure we offer the right solution for any demand.

Through an ever ongoing process we are always focused on developing Oxymat to be cost-effective and ahead of the competition in terms of quality, performance and price. This strategy has made it possible to grow to the size and position Oxymat has in the market today. Our 2015 turnover was 20,1 mil. € and our product range is the most energy efficient in the market and even at a competitive price.

Our team of specialists will always be able to serve any demand. From our extensive standard industrial or marine programme to highly specialized turnkey projects, Oxymat will provide the quality solution. We offer a wide range of standardized control systems, and remote access and offer to tailor make automation solutions according to your requirement.

It is our priority to always deliver high quality products and services. Oxymat holds all relevant approvals for serving the numerous applications we supply.

- ISO 9001
- ISO 13485
- ISO 14001
- ISO 18001 (OHSAS)
- PED 97/23/EC Module B+D
- MDD 93/42/EEC (Medical Device Directive)

Marine Class societies - we can deliver according to the rules of:

- American Bureau of shipping
- Bureau Veritas
- Det Norske Veritas
- Germanischer Lloyd
- Lloyd's Register
- Nippon Kaiji Kyokai
- RINA

Why Oxymat?

Oxymat provides you with gases perfectly matched to a wide variety of applications in the pharmaceutical industry. No matter your need or application we can provide state-of-the-art design to meet your requirements. We strongly believe Oxymat Oxygen and Nitrogen generators are perfect for your applications to generate these gases on-site using standalone Oxymat gas generators according to your purity requirement.

Special design features include:

- Nitrogen produced with purity range 95% - 99.9999%
- Low energy consumption
- Low CO2 emission
- Heavy duty construction designed for rough conditions
- High quality & durable components
- Container installed systems
- Frame-built design
- Plug and play installation
- High quality Touch Screen Control Unit (Customized control system)
- Specialist support from planning, installation and operation of your project
- Fully automated generator; Remote Control Access
- All systems can be expanded with cylinder filling option
- Very easy to install, operate and require very little maintenance and service.
- Our systems are designed for 24 hours, 365 days a year operation.
- A Nitrogen generator combined with cylinder backup gives the highest level of safety.

Benefits of Oxymat Generators compared to other gas sources:

- Only produce the gas you need, when and where you need it - supply in exact quantity and quality needed
- No loss of production time due to running out of gas
- Quick return of investment / 1-2 years
- Elimination of on-going costs (refills, delivery and transportation charges etc.)
- Energy efficient. Only electricity is needed to run the generators
- No safety risks of handling of high pressure cylinders
- In comparison with cylinders it gives overall cost reduction up to 80%.
- Safe delivery; controlled flow and uninterrupted gas

So, why buy expensive bottled or bulk Nitrogen/Oxygen when you can make your own?

Bringing Nitrogen to your business

Food, Beverage and Pharmaceutical Industry

In the Food & Beverage Industries, the use of Nitrogen as a food preservative is gaining widespread acceptance. Being a non-chemical method of food preservation, it can improve the quality and expand the availability of perishable commodities. Furthermore, it leaves no chemical residues.

In the Pharmaceutical Industry, Nitrogen is used in packaging of pharmaceuticals and prohibits explosions as well as ensures fire safety in activities where inert dispersed substances are used. It also serves as an inert replacement for air where oxidation is undesirable.

Why Oxymat PSA Generators Are The Wise Choice?

Oxymat provides you with gases perfectly matched to a wide variety of applications in the Food, Beverage and Pharmaceutical Industries. No matter your need or application we can provide state-of-the-art designs to meet your requirements.

We strongly believe Oxymat systems are perfect for your applications and can help you save money on your Nitrogen costs and allow you to produce Nitrogen gas on-site. Simple and cost effective from a supply of compressed air, it helps you avoid rental charges, transportation expenses, labour costs, and evaporation losses of bulk systems.

Why Pack Food With Nitrogen Gas?

Free Oxygen is a major culprit in food spoilage. The most effective way to prevent Oxygen damage is to remove and replace the Oxygen with an inert gas such as Nitrogen. Nitrogen is an efficient, cost-effective way to displace Oxygen and moisture and it does not react with food like Oxygen does. The foods stay fresh longer and it does not affect the flavour or texture of the food and helps to protect the delicate foods inside.

Advantages:

- Improve quality and shelf life of air-sensitive materials
- Increase exports to long distance markets
- To maintain and preserve freshness of packaged or bulk foods
- Eco conservation
- Strip out volatile contaminants, improve efficiency
- Safe storage
- Delaying rancidity and other forms of oxidative damage
- Serving as an inert replacement for air where oxidation is undesirable
- Slow down the decay process
- Easily and economically improve product quality
- Prolong the shelf life of raw fresh and processed foods
- No degeneration of product during processing and storage
- Eliminate bugs and micro-organisms



Skid-mounted Nitrogen generator with filling station

E-No	Gas
E 290	Carbon dioxide
E 938	Argon
E 939	Helium
E 941	Nitrogen
E 942	Nitrous Oxide
E 948	Oxygen
E 949	Hydrogen
E 941/E290	70% N2 & 30% CO2
E 941/E290	50% N2 & 50% CO2
E 948/E290	70% O2 & 30% CO2

Nitrogen E 941 - Maximum impurities*	
Nitrogen	< 99%
THC as CH4	≤ 100 ppm
Water	≤ 0.05%
N2 & NO	≤ 10 ppm
Oxygen	≤ 1%
CO	≤ 10 ppm
*EIGA Directive 2000/63/EC - purity criteria for food grade	
Oxymat meets the European Food Quality Standards for on-site Nitrogen	
Source: www.EIGA.com	

Minimum specifications for food gas applications

Nitrogen Applications in Food,

Nitrogen Inerting and Blanketing:

Blanketing & inerting is the use of Nitrogen to maintain an inert atmosphere above a liquid or powdered product inside a storage tank, silo, reactor, process equipment or other vessel. The inert gas will help prevent product degradation from moisture and Oxygen, control volatile emissions, and safeguard against fires and explosions. Nitrogen blanketing for food is usually done during the storage stage, when the food products are stored in a vessel. The head space of the tank is filled with Nitrogen which displaces the atmospheric air including Oxygen and water vapour to avoid oxidation.

Products: Edible oil and fat (olive oil, sunflower oil, soybean oil, margarine etc.), all types of soft drinks (juices, mineral waters, soda drinks), syrups, dairy products (cheese, powdered milk, condensed milk, yogurts, liquid eggs and butter), wine, pharmaceuticals packaging etc.

Purity: 97 – 99%



Controlled Atmosphere Storage (CAS):

This technique is used to preserve fresh fruits and vegetables or to enhance ripening by modifying the gaseous composition of the atmosphere in which the food products are stored. The atmosphere is closely monitored and precisely controlled to maintain the desired gas proportions throughout the storage period.

Products: Food products, fruits and vegetables, salads, fruit orchards, fruit storage and packaging machines etc.

Purity: 95 – 99.999%



Pest Control and Grain Fumigation:

This technique is used to create an oxygen deficient atmosphere to kill 100% of all life stages (eggs, larvae, pupae, and adults) of insects which have infested agricultural commodities in silos and warehouses. The process requires the commodity remain sealed in a carbon dioxide or Nitrogen atmosphere for at least four days.

Products: Agricultural commodities (grain, flour, oats, rice, tobacco in silos and warehouses), fruit & vegetables etc.

Purity: 95 – 99.5%



Modified Atmosphere Packaging (MAP):

Modified atmosphere packaging is a packaging technique for packaging products by removing atmospheric air from the package and replacing with a mixture of inert gases such as Nitrogen. During packaging the air is purged or evacuated from the interior of the package, replaced with a gas or gas mixture, and quickly sealed. Typical shelf life with MAP is 1-2 years.

Products: Meat products (sausages, salami, sliced meat products etc), pre-cooked foods, wine, fruit juice, fish, yeast, tea, salads, nuts and dried fruits, dairy products (cheese, powdered milk, condensed milk etc.), coffee (whole beans, ground coffee, or espresso pods), pharmaceuticals packaging etc.

Purity: 95 – 99.5%



Undercover Gassing:

Nitrogen flushes out Oxygen from the headspace of lidded containers immediately before sealing. This technique can extend the shelf life of Oxygen sensitive products. Undercover gassing can be used with liquids, solids and powders packaged in cans, jars or bottles.

Products: Canned nuts, canned condensed milk, bottled beer etc.

Purity: 97 – 99%



Beverage & Pharmaceutical Industries

Nitrogen Injection:



In this process the Nitrogen is injected precisely into each container at a predetermined rate which pressurizes the container adding to its rigidity. In carbonated drinks Nitrogen pressure helps to keep the carbon dioxide in solution by occupying the container headspace which adds value to the product.

Products: Carbonated or still beverages, beer, wine, juice drinks, tea, bottled water etc.

Purity: 95 – 99.999%

Sparging/Stripping:



Stripping describes the removal of contaminants such as dissolved Oxygen from a process stream by use of a gas such as Nitrogen resulting in increased shelf life and prevents oxidation, discoloration and flavour and aroma loss. Sparging is the specific method of stripping which involves bubbling a gas through a liquid. Nitrogen sparging/stripping helps strip out volatile contaminants, improve efficiency in-vessel and in-line systems.

Products: Pharmaceuticals packaging, oil storage vessels etc.

Purity: 97 – 99%

Purging:



Nitrogen purging is the replacement of an atmosphere of undesired composition in an enclosed space with another atmosphere of preferred composition. Purging preserves food quality by eliminating undesirable substances and also to eliminate bugs and micro-organisms, thus inhibiting and reducing undesirable chemical reactions with Oxygen.

Products: Wine industry, food industry, pharma industry, purging cargo hulls, holds, tanks, vessels etc.

Purity: 97 – 99%

Nitrogen Flushing:



Food manufacturers use Nitrogen flushing and sealing machines to force the regular air out of the packaging and inject Nitrogen into the packaging. Nitrogen is used to flush the bottles, hoses, pumps and tubing before and after bottling to sterilize them and to flush out the Oxygen. Using Nitrogen helps eliminate the need to use water in the bottles before adding the products.

Products: Coffee beans, nuts and dried fruits, rice cakes, snacks (chips, tortillas, popcorn, pretzels, crackers etc.), bottling various types of liquids and beverages etc.

Purity: 95 – 99.999%

Aerosol Propellant:



Typical non-soluble inert propellant gases such as Nitrogen is sometimes used in aerosol dispensed products and is an environmental alternative to LPG because of their low price as it does not effect a chemical change to the substance which they protect.

Products: Creams, oils, cheeses, pharmaceutical aerosols

Purity: 95 – 99.999%

Beverage Mixing / Dispensing:

Mixes of CO₂ and Nitrogen are increasingly used in the brewing industry, particularly in beer dispense applications. The system uses a Nitrogen generator when connected to CO₂ cylinders, can produce mixed blends of CO₂ and Nitrogen in a number of predetermined ratios.

Products: Breweries, large venue contractors, dispensing systems manufacturers, wine makers etc.

Purity: 95 – 99.999%

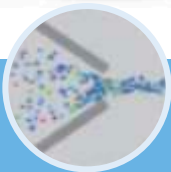
Technology/Process Description

The PSA process is an extremely clean operation and the only 'raw material' is 'air'. On-site generators allow for an uninterrupted supply of gas with a high purity output. This means that you can produce gas where and when you need it, and in the exact quantity and quality you need.

- PSA = Pressure Swing Adsorption and Oxygen molecules are adsorbed under pressure.
- Oxyamat uses two columns with molecular sieves to ensure continuous production.
- 7 bar(g) dry compressed air feed one column of the generator where the pressure is built. O₂ is tied to a molecular sieve during pressurization, and the N₂ is allowed to pass through to the Nitrogen receiver tank.
- While pressure is built in on vessel, the second remains standby without pressure.
- A part of the produced gas is used for regeneration of the molecular sieve in the standby column.
- Carbon Molecular Sieve (CMS) is inside the columns of the generator. The molecular sieve is fully regenerative and has a life span of 40,000 operation hours in the Oxyamat generators.



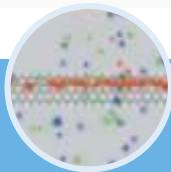
Process description



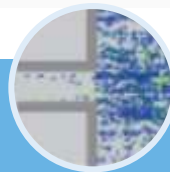
Compressor
increases air to required pressure level



Dryer
removes moisture from air (air humidity) by cooling



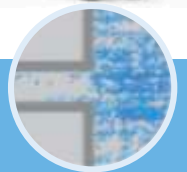
Coal tower
adsorbs harmful organic impurities such as oil vapours and hydrocarbon



Air tank
accumulates necessary volume of air for PSA generator



CMS
filling with its ion-exchange bed traps oxygen molecules and allows nitrogen molecules to stream through



High Purity Nitrogen
flows from PSA generator to product tank and is ready for use

Scope of supply of a typical nitrogen generator system

Features & Benefits of the Oxymat System

MAP shelf life extension

Product Type	Gas	In air	In MAP
Food & beverages (liquid)	N2	3-7 days	1-3 weeks
Food products (dried)	N2	6 months	1-2 years
Cheese (grated & soft)	N2/CO2	2-3 weeks	2-3 months
Fruits & vegetables (fresh)	N2	3-6 days	1-5 weeks
Chilled, ready meals (pre-cooked)	N2/CO2	1-4 days	1-2 weeks
Meat (cooked & Chilled)	N2/CO2	1-2 weeks	1-2 months

MAP other gases

Product type	O2	CO2	N2
Raw red meat (beef, pork, etc)	70%	30%	
Raw Offal (heart,liver, etc)	80%	20%	
Poultry (chicken, turkey, etc)	70%	30%	
Raw high-fat fish (trout, tuna etc.)		40%	60%
Ready meals		30%	70%
Bakery products		50%	50%

Some products packed with nitrogen:

- Edible oil and fat (olive oil, sunflower oil, soybean oil, margarine)
- Soft drinks (juice, mineral water, soda drink) and Syrups
- Dairy products (cheese, powdered milk, condensed milk, yogurts, butter)
- Beer and Wine
- Pharmaceuticals packaging
- Fruits and vegetables
- Agricultural commodities (grain, flour, oats, rice and tobacco in silos and warehouses)
- Nuts (peanuts, cashews, almonds) and dried fruits
- Rice cakes
- Snacks (chips, tortillas, popcorn, pretzels, nachos and crackers)
- Meat products (sausages and salami, sliced meat products)
- Pre-cooked foods
- Fish, dried fish & seafood
- Yeast
- Salads, fresh cut salads
- Coffee (whole beans, ground coffee or espresso pods), tea, cocoa powder
- Spices

Cylinder Filling Station:

All systems can be expanded with cylinder filling option. A Nitrogen generator combined with cylinder backup gives the highest level of safety.

Custom Design:

Heavy duty construction and design for rough conditions using high quality & durable components, container installed systems, frame-built design.

Support:

Very easy to install, operate and require very little maintenance and service. Specialist support from planning, installation and operation of your project.

Safety:

Low operating pressures, no hazardous storage of cryogenic Nitrogen, no safety risks of handling of high pressure gas cylinders.

Touch Screen Control:

High quality Touch Screen Control Unit (Customized control system). Precision system control for purity level, troubleshooting diagnostics, maintenance schedules and operation diagrams.

Convenience:

Easy to install and maintain with an unlimited supply of Nitrogen. The generator's PLC operates the generator automatically, starting and stopping the nitrogen production in direct response to demand in the downstream distribution system. Only produce the gas you need, when and where you need in exact quantity and quality needed.

Flexibility:

Unmatched System Lay-Out Flexibility. No matter your need or application we can provide state-of-the-art design to meet your requirements.

Cost Savings and Fast Payback:

Quick return of investment 1-2 years. Generators save you handling and storage costs of high pressure gas cylinders and avoids rental charges, transport costs and bulk user evaporation losses. No loss of production time due to running out of gas.

Efficiency:

The Oxymat generators have higher separation efficiency than any other PSA system in the market with reduced feed air requirements resulting into lower energy requirement.

Fully Automatic & Remote control:

Fully automated generator; Unattended Operation; Remote Control Access; Production begins when demand downstream is sensed. The system will go into standby mode when Nitrogen is not required.

Reliability:

High reliability through fewer moving parts and high quality components. You will get controlled low and uninterrupted N2 gas supply 24/7.

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Highest level of international approval

Oxymat Oxygen and Nitrogen systems are designed and manufactured according to European directives:

- PED (97/23/EC)
- MDD (93/42/EEC)

Oxymat has vast experience in designing, engineering and delivering of thousands of Oxygen and Nitrogen systems all over the world, in accordance with international and national authorities.

Oxymat operates a QA system in accordance with international standards

- ISO 9001 (Quality Management Systems)
- ISO 13485 (Quality Management Systems – Medical Devices)
- ISO 14001 (Environmental Management Systems) certified by Apragaz.
- ISO 18001 (OHSAS)

