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## Atlas Copco Group

Atlas Copco is an industrial group with world-leading positions in compressors, expanders and air & gas treatment systems, construction and mining equipment, power tools and assembly systems. With innovative products and services, Atlas Copco delivers solutions for sustainable productivity.

The company was founded in 1873, is based in Stockholm, Sweden, and has a global reach spanning more than 170 countries. In 2011, Atlas Copco had about 37,500 employees and revenues of BSEK 81 (EUR 9).

**Learn more at [www.atlascopco.com](http://www.atlascopco.com).**



*Atlas Copco*

[www.atlascopco.com](http://www.atlascopco.com)

**Generate your own nitrogen supply for improved efficiency**



**Extract nitrogen from the air  
instead of buying it**

*Sustainable Productivity*

**Atlas Copco**



Nitrogen is a colourless, tasteless and odourless gas ideal for reducing oxidation



## What is Nitrogen?

Nitrogen is an inert, odourless and colourless gas that doesn't sustain life. It is extremely useful in industry as it prevents fast and slow oxidation.

Fires or explosions are perfect examples of fast oxidation. If a vessel is flushed with nitrogen, the oxygen is removed, along with the risk of fire or explosion as these processes need to be fuelled by oxygen. Nitrogen is also used to prevent slow oxidation, i.e. the corrosion of non-organic products or the growth of bacteria in food products.

The level of purity needed for nitrogen depends upon its use. For most applications, high purity (over 95%) is necessary, a level easily achieved by both Atlas Copco's Membrane and PSA technologies. A purity of 99,9999% can even be reached.

Since the number of applications for nitrogen is increasing, there is a growing tendency for businesses to generate nitrogen on site, rather than using liquified nitrogen, particularly in view of the fact that the technology has significantly evolved, making it more competitive not to mention safer to handle.

## NG (Pressure Swing Adsorption Nitrogen Generator)



## NGM (Membrane Nitrogen Generation)



# A reliable partner throughout the whole process of nitrogen generation

Atlas Copco is your reliable partner throughout the whole nitrogen generation process, supplying equipment all the way from compressors to our PSA or Membrane units. Together with our **proven track record** and our **worldwide presence**, having a **single point of contact** will set your mind at ease, saving costs and allowing you to work more efficiently.

### On-site nitrogen generation eliminates transport costs

Our compact Nitrogen generators enable you to produce nitrogen on site, which eliminates all costs attached to transport and bottling, **thereby improving cost-efficiency in relation to other types of generation.**

### Adjust the purity of the nitrogen to its purpose

For certain applications, nitrogen purity has to be close to 100%, whereas for others, a lower level is perfectly adequate. Atlas Copco generators can ensure that you reach **the exact required quality or purity** without any unnecessary expense, due for instance to the purchase of bottles of nitrogen, which are only available with N<sub>2</sub> in the purest form.

# A complete concept for nitrogen generation, that's our offer!

Atlas Copco offers the whole range of machinery for nitrogen generation, from initial compression and filtering right through to the gas's storage. As a result, with just a simple phone call to your Atlas Copco contact person, any failure in the production process is handled promptly without you having to worry about who to contact.

## NG (Pressure Swing Adsorption Nitrogen Generator)

COMPRESSOR

**Compressor:** Atlas Copco's compressors guarantee a reliable and efficient supply of compressed air to the nitrogen system.



FILTERS

**Filter:** Our air filters ensure a proper filtration of the compressed air with a minimum of pressure drop and a long cartridge lifetime.

DESICCANT DRYER

**Desiccant dryer:** Atlas Copco's desiccant dryers dry the compressed air using a minimum of energy and generating a minimum pressure drop.

FILTERS

**Filter:** Our air filters ensure a proper filtration of the compressed air with a minimum of pressure drop and a long cartridge lifetime.



## NGM (Membrane Nitrogen Generation)

COMPRESSOR

**Compressor:** Atlas Copco's compressors guarantee a reliable and efficient supply of compressed air to the nitrogen generation system.



FILTERS

**Filter:** Our air filters ensure a proper filtration of the compressed air with a minimum of pressure drop and a long cartridge lifetime.

ACTIVATED CARBON TOWER

**Activated carbon tower:** To ensure a proper protection of the membrane unit and to remove all hydrocarbons and ozone from the compressed air, an activated carbon tower with a long stand time is installed in front of the membrane unit.

MEMBRANE UNIT

**Membrane unit:** Atlas Copco's NGM delivers the required nitrogen flow at the required purity.





## AIR VESSEL

**Air Vessel:** The PSA process, which is inherently a fluctuating procedure, naturally requires a fluctuating inlet flow. To guarantee the smooth operation of the compressed air system, an air vessel is installed before the NG.

## PSA UNIT

**PSA unit:** Atlas Copco's NG delivers the required nitrogen flow at the required purity with PSA technology.



## N<sub>2</sub>-VESSEL

**Nitrogen vessel:** Since nitrogen production is a discontinuous process, a nitrogen vessel is installed at the outlet of the NG to guarantee a continuous outlet flow of nitrogen.



# The right solution for a whole range of applications

At Atlas Copco, we know your application and our solutions are a perfect match for your needs. Nitrogen is used in many industries, either in the production process itself or for the handling and storage of goods. This gas can be used either to protect the environment from the product or vice-versa. It is also utilised in applications such as soldering and moulding for increased effectiveness.

## 1. Blanketing

Tank Blanketing refers to applying a cover of nitrogen gas over the surface of a stocked commodity to protect or contain the stored product or prevent it from causing harm.

### **Blanketing:**

- Prevents liquid from vaporizing into the atmosphere
- Reduces ignition potential
- Prevents oxidation or contamination of the product by reducing its exposure to atmospheric air
- Reduces the moisture content

**Surface Equipment Inerting:** By applying a cover of nitrogen, explosions in the environment can be prevented.

**Transport:** Nitrogen blanketing is used for protection during the transport of flammable and oxidising products.

**Glass Industry:** Blanketing with nitrogen prevents tin from oxidizing. It also prevents air infiltration during the process.

**Pharmaceutical industry:** Nitrogen is used for inerting flammable products, and on the other hand, to protect fragile products against oxidation and humidity.

**Metal annealing:** Nitrogen is used to purge heat treat furnaces and reflow solder baths.

**Chemical industry:** Applications include blanketing for storage, the regeneration of purification beds, the preparation of catalysts, and the transport of polymer powders. Nitrogen also serves as a medium for the exhaust of heat in fluid bed reactors and to control temperature in reactors.



## 2. Modified Atmosphere Packaging (MAP)



MAP is an increasingly popular technique used to easily and economically improve product quality and extend shelf-life.

Flushing packaged foods with inert high purity nitrogen delays aerobic spoilage and oxidative deterioration by typically reducing the oxygen level in packaged foods to below 1% so that food tastes as good as the day it was made.

Nitrogen is primarily used to reduce the oxygen content within food packaging and to avoid product deterioration. A secondary reason for using nitrogen is as a filler gas to provide a pressurised atmosphere that prevents package collapse.

## 3. Electronics

### **Electronic Packaging**

The presence of moisture and oxides can lead to reductions in yields.

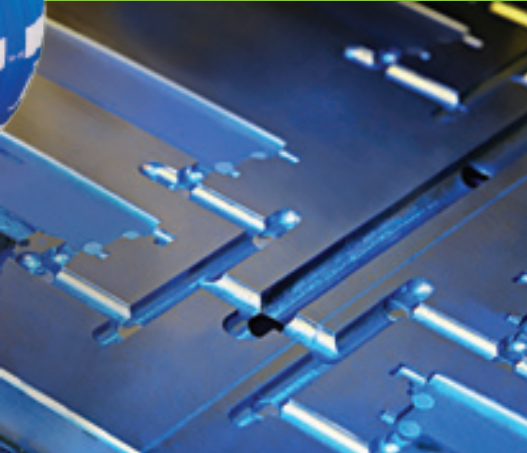
Nitrogen has become a key to preventing some of these problems by creating an inert area around the process that is free of moisture and other impurities.

### **Reflow soldering**

In this process, nitrogen is used to drive out the oxygen from the soldering chamber. This prevents the solder pads and component terminals from oxidising during the reflow of the solder paste. Furthermore, improved soldering quality and less reoxidation increases the strength of the solder joints. The process window is also enlarged.



## 4. Gas Assist Injection Moulding



Nitrogen is used to reinforce ribbed parts, which eliminates sink marks and surface blemishes. The gas is injected with a uniform pressure distribution throughout the mould.

This means larger parts can be produced with less tonnage on smaller machines, which reduces capital investment when purchasing new equipment. Another benefit is weight reduction while rigidity is preserved, and it also makes it possible to produce piping with intricate shapes.

Gas-assist injection moulding is faster and uses less material, saving you time and money.



# Two performing technologies to meet your specific demands

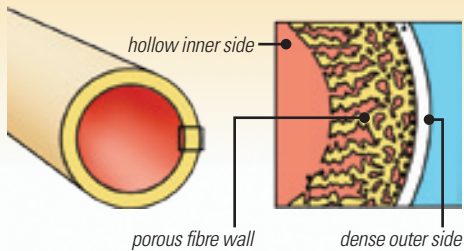
Whether you need nitrogen of the highest purity or of a lower purity for your specific application, Atlas Copco has the perfect technological solution for you.

In the case of membrane air separation, air is pumped through membrane fibres, a process whereby nitrogen is filtered out as it permeates more slowly through the membranes. In the case of Pressure Swing Adsorption, Carbon Molecular Sieves capture oxygen, as a result of which the concentration of nitrogen at the outlet increases (up to 99.9999%).

## NGM (Membrane Nitrogen Generation)

The NGM

Hollow fibre with asymmetric structure



The NGM consists of several parallel membranes, each of which consists of a bundle of fibres. These fibres are polymer structures with the membrane as a thin layer at the outside.

Gas separation takes place as the pressurized air flows through the fibres. When they enter into contact with the membranes, 'fast' gases such as oxygen, carbon dioxide and water

vapour quickly permeate through the fibre walls and exit at atmospheric pressure through the vent port on the side of each module.

Nitrogen, a "slower" gas, does not permeate through the fibre walls as quickly under flowing conditions. As a result, enriched nitrogen exits the product manifold on the end of the module housing at a slightly lower pressure than the air entering the housing.

Water vapour is also separated through the membrane. As a result, the nitrogen will have a pressure dew point of  $-40^{\circ}\text{C}$  as a minimum, which means in most of cases that no additional drying is required.

The membranes are sensitive to water droplets and other contaminations, so inlet filtration is required.



## NG (Pressure Swing Adsorption Nitrogen Generation)



The NG unit consists out of two vessels, both of which contain Carbon Molecular Sieves (CMS). While one tower is capturing the oxygen, the other one is regenerating.

The CMS is a type of activated carbon with pores in which the oxygen molecules are captured, whereby the output flow has reduced oxygen content. The purity of the nitrogen at the outlet of the NG can be as high as 99.9999%.

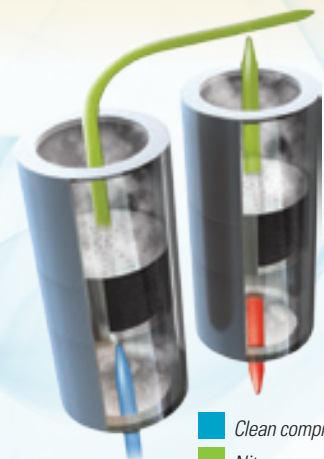
Since the CMS is very sensitive to humidity, the air has to be dried before entering the NG unit. This can be achieved either with a refrigerant dryer or an adsorption dryer, depending on the required pressure dew point of the nitrogen at the outlet of the unit.

Nitrogen generation with PSA technology is a discontinuous process. To level out fluctuations in nitrogen flow, an air receiver is installed at the inlet of the unit and a nitrogen receiver at the outlet of the unit.

The units are built according to the required customer specifications.



*The Carbon Molecular Sieve has a much narrower range of pore opening than the standard activated carbon which allows the NG to deliver a purity of up to 99,9999%.*



- Clean compressed air
- Nitrogen gas
- Oxygen exhaust
- Carbon Molecular Sieve



*The small oxygen molecules will penetrate the pores while the big nitrogen molecules will by-pass the Carbon Molecular Sieve.*



# A complete and reliable package

## NGM (Membrane Nitrogen Generation)



The NGM nitrogen generator is supplied as a package containing the inlet air treatment equipment, the regulating valves, the membranes, the nitrogen outlet package and the controls. The range is available for purities of 95% up to 99,5% and Nitrogen flows from 100 Nm<sup>3</sup>/hr up to 1000 Nm<sup>3</sup>/hr. This is the standard range and is called NGM.

Higher purities and flows can be provided on request. Furthermore, higher customer specs can be met by our NGME units, which are the engineered products.

## Application range

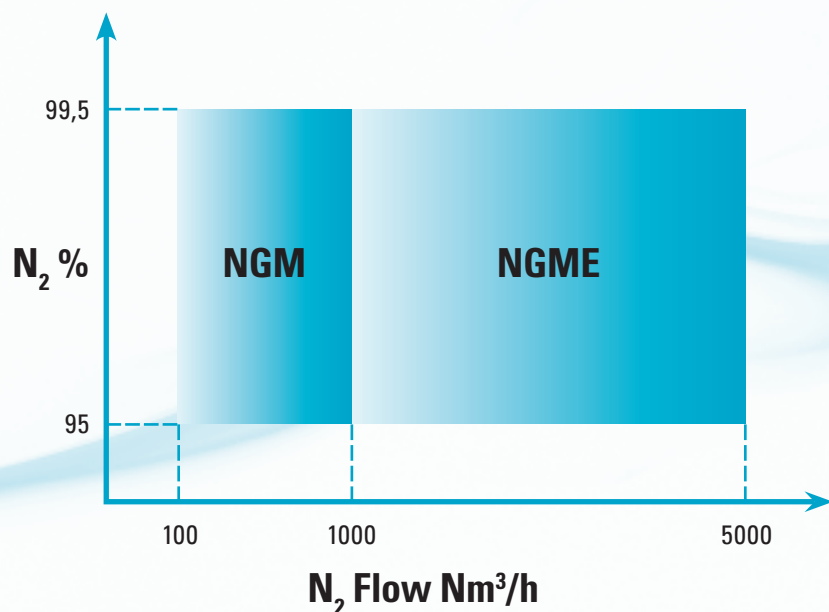
NGM's can operate in a much wider range of conditions:

- From -10°C to 75°C inlet temperature
- From 4-25 bar inlet pressure
- For purities of 95-99,5%

## Benefits

Advantages of an NGM unit:

- The most efficient system for working at lower purities
- Light and easy to transport
- Not sensitive to vibrations
- No moving parts means less maintenance
- No need for extra dryer
- Constant flow
- Modular, i.e. a membrane can be removed while the unit can keep on working





## NG (Pressure Swing Adsorption Nitrogen Generation)

The NG nitrogen generator is supplied as a package containing the inlet air piping, controls and valves.

The unit consists of two pressure vessels both filled with carbon molecular sieves.

The range is available for purities of 98% up to 99,999% and Nitrogen flows from 50 Nm<sup>3</sup>/hr up to 2000 Nm<sup>3</sup>/hr. This is the standard range and is referred to as NG.

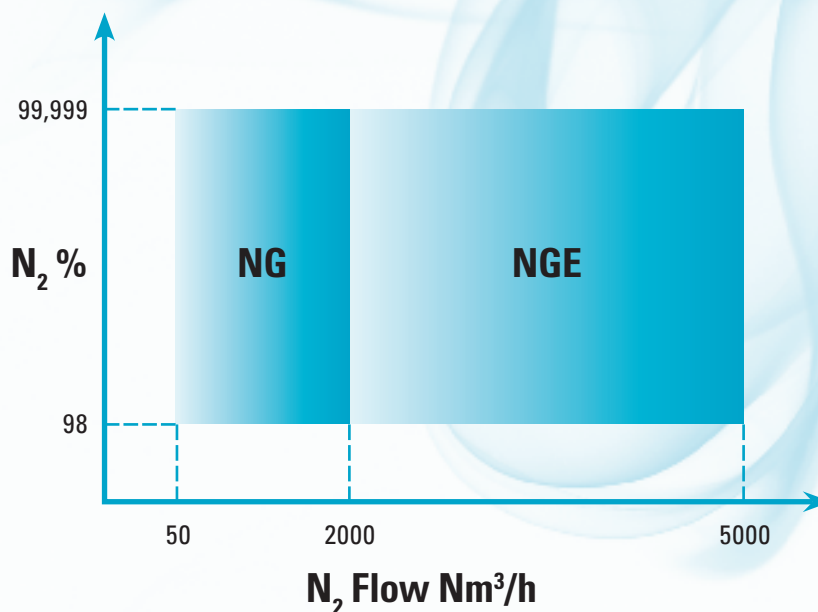
Higher purities and flows can be provided on request, and higher customer specs can be met by our NGE units, which are the engineered products.



### Application range

The NG operates effectively in a limited range:

- From 10-25°C inlet temperature
- From 4-13 bar pressure
- For purities of 98-99,999%



### Benefits

Advantages of a NG unit:

- More efficient at higher purity levels
- Cost-efficient
- Easily customizable
- Compact unit for bigger flows
- The exact nitrogen purity to meet your application demands