

# How on-site nitrogen production works - PSA versus membrane technology

Before nitrogen can be produced on site, the gas must be obtained and transported to different industrial applications via cylinders and tanks. This process can be very cumbersome and problematic. Operators have therefore chosen one of the two available technologies for adequate on-site nitrogen production. This article explores how nitrogen generators (PSA nitrogen generators, nitrogen plants) work and their various benefits to help you discover which system is best suited to your objectives.

## How do on-site nitrogen generators work?

The air we breathe is approximately 78% nitrogen, 21% oxygen, and negligible amounts of other gases. Industrial operators have found ways to use this higher percentage of nitrogen to generate nitrogen for a number of applications.

On-site nitrogen generation involves separating the nitrogen from the other air components. It ensures a reliable and economical supply of nitrogen for laser cutting, chemical covering, food packaging and a range of other industrial applications.

Whatever your needs, on-site nitrogen generation units are preferable and more profitable than traditional nitrogen supply methods: purchased from suppliers and transported to site in cylinders and tanks. They rely on membrane or variable pressure adsorption (PSA) technology to achieve the high purity levels suitable for any application. The next sections reveal the differences between these two technologies, while taking a closer look at why a nitrogen generator (PSA nitrogen machine, nitrogen plant) installation may be the best option for your nitrogen supply.

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## PSA technology versus membrane technology for on-site nitrogen production

PSA and membrane technologies are the two main production methods widely used for on-site nitrogen generation for a variety of industrial applications. Although both technologies require different amounts of clean, dry compressed air for their operation, they work on different principles.

### PSA Nitrogen Generation Systems

A PSA nitrogen generator (PSA nitrogen machine, nitrogen plant) effectively separates nitrogen from the gas stream. It does this safely, reliably and economically with the aid of carbon molecular sieves (CMS).

With a PSA nitrogen generator, the operator fills two containers with CMS which adsorb oxygen molecules from the compressed air passing through them. While one is adsorbing, the other is depressurising, allowing a small amount of nitrogen to flow downwards to release the adsorbed oxygen. This continuous process ensures that the two vessels alternate between adsorption and depressurisation to produce nitrogen gas with a purity of up to 99.9995%.

### The benefits of PSA systems

Some of the key benefits of PSA systems for nitrogen production include

Nitrogen purity levels of up to 99.9995%

Highly reliable nitrogen production system

Low maintenance levels due to the use of clean and dry compressed air feed

Highly consistent as it produces large quantities of nitrogen

## Membrane nitrogen generators

The separating membrane is the most critical part of the nitrogen membrane system. It consists of thousands of hollow fibres through which compressed air is passed to ensure efficient nitrogen production. Oxygen, carbon dioxide and other gases pass through the hollow fibres more easily than nitrogen. These gases are then released into the atmosphere, leaving a very pure stream of nitrogen at the membrane outlet. The operator only needs to vary the flow rate and pressure of the compressed air to achieve a very high level of purity.

## Benefits of hollow fibre membrane systems

The main benefits of using hollow fibre membrane systems for on-site nitrogen production include

Due to its mountability, it is easily applied in confined spaces.

Produces high quality nitrogen with a purity of 95-99.9%.

Its compact and noiseless operation makes the production and supply of nitrogen more environmentally friendly.

Low maintenance requirements due to its low number of moving parts.

High levels of durability and reliability due to limited maintenance requirements.

## Benefits of purchasing an on-site system from Suzhou XITE Gases

Suzhou XITE Gases nitrogen systems offer the highest quality standards for on-site nitrogen production. Here are some of the main benefits of purchasing these systems.

## Cost-effective

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