EVONIK INDUSTRIES

SEPURAN® N_2

Membrane technology for efficient nitrogen generation

SEPURAN® N_2

Evonik. Power to create.

Gas separation with SEPURAN®

Evonik, the creative industrial group from Germany, is one of the world leaders in specialty chemicals. As a technological leader in the field of high-performance polymers we offer hollow-fiber membranes for efficient and energy-saving gas separation.

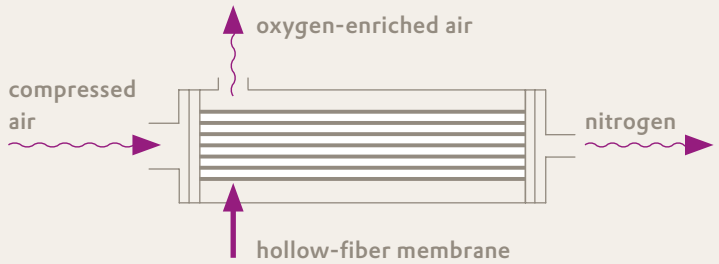
Advantages:

- Very high selectivity
- Low energy consumption
- Separation at room temperature
- Low space requirements
- Continuous separation process
- Simple modular setup
- Flexible and easily expanded
- No other auxiliary materials, such as water and sorbents, required
- No emissions into the environment

Fields of application:

- Nitrogen generation
- Hydrogen upgrading
- Helium recovery
- Extraction of Methane

Functioning of a membrane module for nitrogen generation



Permeation rate of air components

How does membrane separation work?

Membranes for gas separation are produced in the form of hollow fibers by a phase-inversion process. Gas separation membranes work on the principle of selective permeation through a membrane surface. The driving force for gas permeation through the membrane is the difference between the partial pressures of the gas on the retentate side (the internal side of the hollow fiber) and the permeate (external) side. The greater this difference, the greater the permeation of gas through the membrane.

In the separation of oxygen and nitrogen, for example, permeation of oxygen through the membrane is strongly favored while nitrogen is retained.

The permeation rate of each gas depends on its solubility in the membrane material as well as on its diffusion rate.

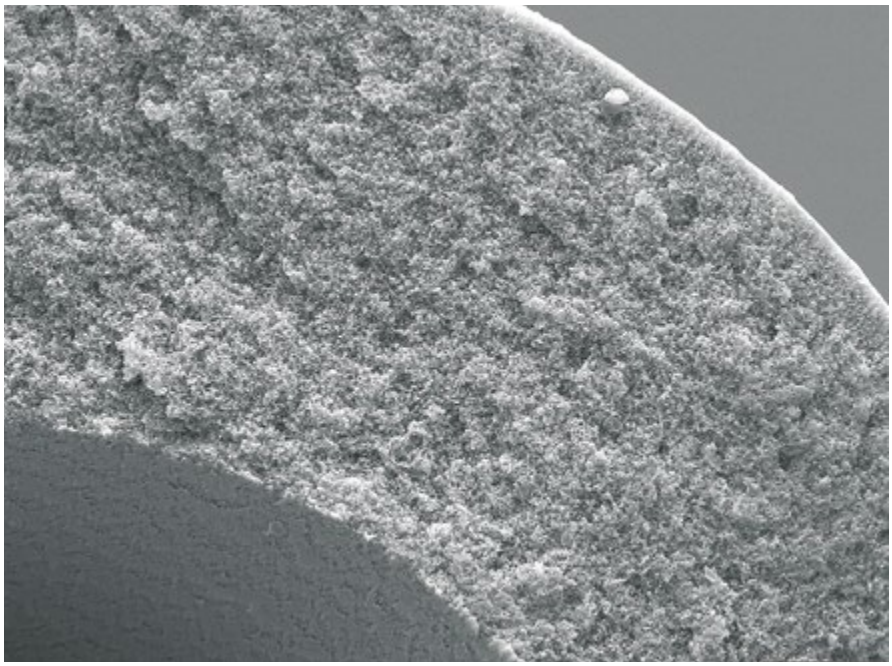
Gases with higher solubility and lower molecular size penetrate the membrane faster than large, less soluble gases.

The ratio of the transport speeds of two gases is termed selectivity.

The higher the selectivity, the higher the energy efficiency of the resulting membrane process.

Different membrane materials show different separation characteristics.

Evonik's membrane polymer, especially tailored for nitrogen generation, is characterized by both high permeability and high selectivity.



The SEPURAN® N_2 membrane module

The SEPURAN® product family includes a number of different membrane systems for gas separation in a variety of applications. SEPURAN® N_2 has been specially developed for nitrogen generation.

SEPURAN® membrane modules consist of several thousand hollow fibers produced from high-performance polymers.
The fibers are bundled together in a stainless steel tube and their ends embedded in a resin.

As many membrane modules as required may be linked together, depending on the particular application and the size of the system. This simple and modular setup, with minimal space requirements in the air separation facility, offers a unique advantage comparing to other technologies.

Our **SEPURAN® N_2** module can be used in a very wide range of applications. In comparison with other membranes available, SEPURAN® N_2 combines excellent capacity with low air consumption.

Alternatively, at low flow rates our SEPURAN® N_2 Selective module can achieve high purity with the lowest air consumption. The energy requirement is particularly low while the capacity remains competitive.
For more specific information, please ask for our Flyer "SEPURAN® N_2 Selective".

High capacity combined with low air consumption

Evonik's SEPURAN® N_2 Module has a high selectivity and a high permeability which combines a low air consumption with high nitrogen capacity. This leads, amongst other advantages, to low energy costs, a small compressor and few modules.

Efficient and cost effective

- More nitrogen production at the same air consumption
- Enormous cost savings compared with conventional gas cylinders
- Low installation and operating costs
- Low maintenance

Simple and safe

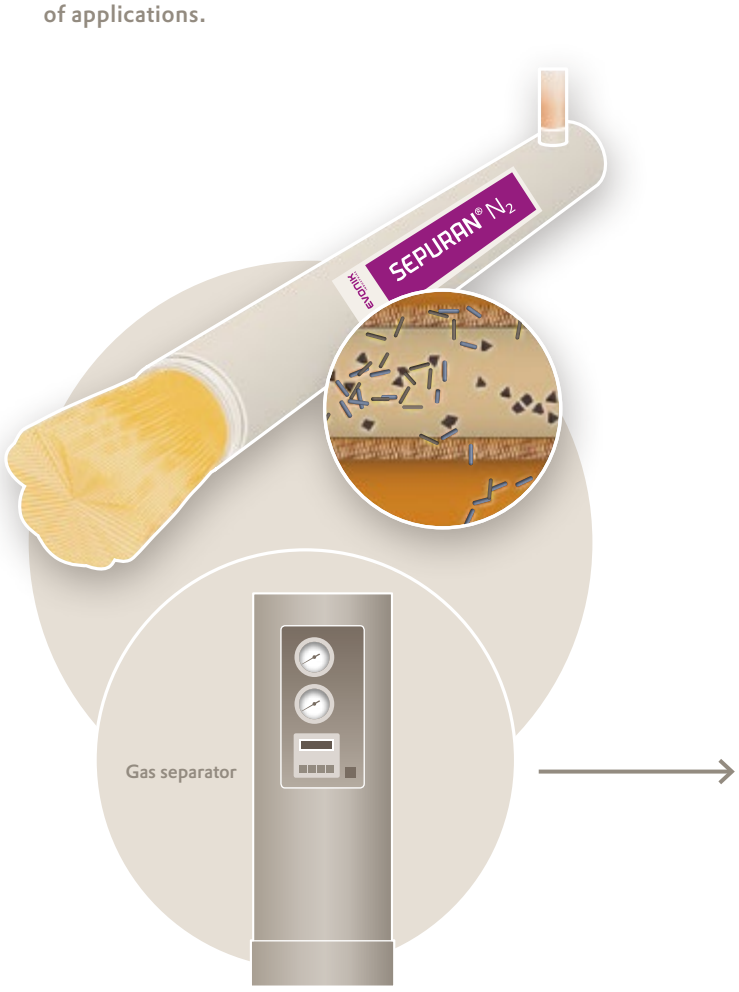
- Flexibility in setting the required purity
- Simple to install and operate
- Safety risks involved in handling cylinders are avoided
- Low space requirements
- Flexible modular setup
- The system can be started and stopped at short intervals, ensuring high flexibility

Technology at the highest level

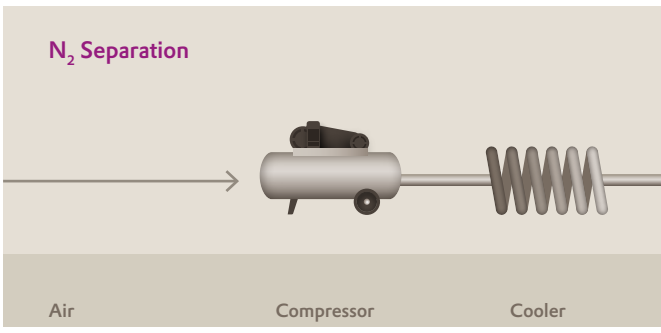
- High capacity combined with low air consumption
- N_2 purity up to 99.5%
- Pressure up to 16 barg (232 psig)
- Stainless steel housing

Application areas

Cost effective air separation and nitrogen generation using SEPURAN® N_2 is particularly useful for blanketing and inerting. Reduction of atmospheric oxygen results in a large number of applications.



- Fire protection
  Fire extinguishing systems
  Explosion protection
- Shipping
- Food storage and transport
- Beverage bottling
- Aviation



Technical data

The composition of the product was determined by measurement of the residual oxygen content.
The "N_2 produced" value is the inert gas content. The "inlet air" value divided by N_2 produced gives the air factor or air/N_2 ratio.

The lower the air factor, the lower the investment and operating costs.
Our technical service experts would be happy to help you optimize your system design.

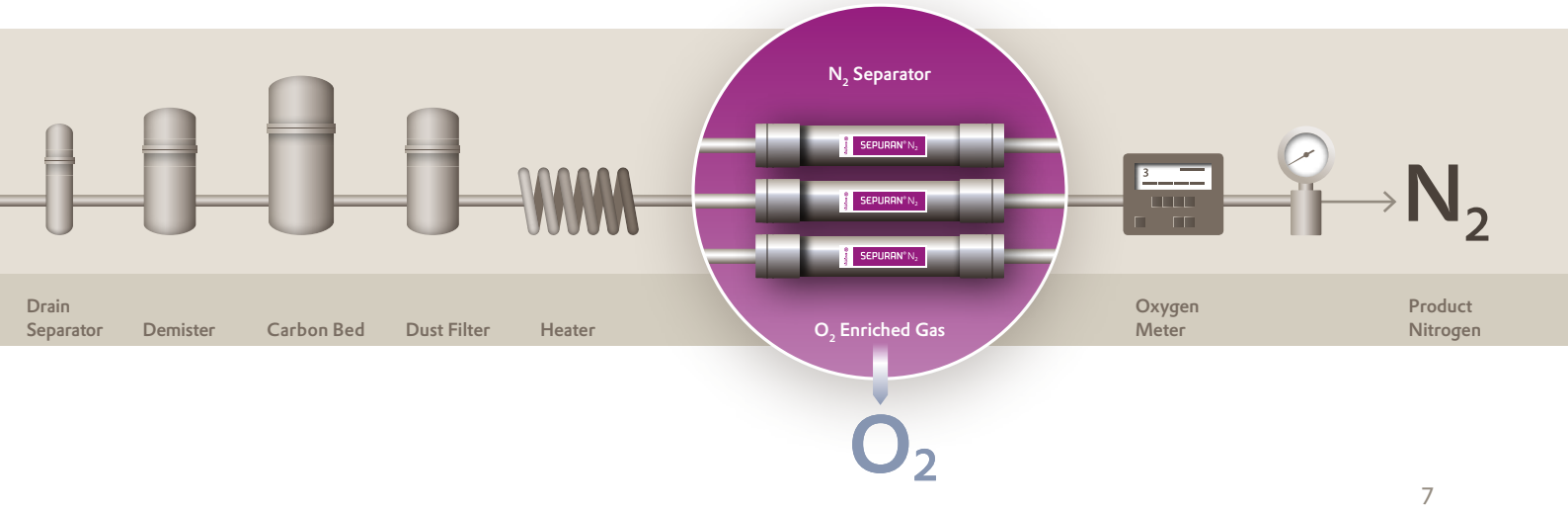
Specifications of SEPURAN® N_2

	in Nm³/h at 7 barg; 25°C (Norm = 0°C; 1 atm)					in scfh at 100 psig; 80°F (Standard = 60°F; 1 atm)				
Purity	99%	98%	97%	96%	95%	99%	98%	97%	96%	95%
N_2 produced	7.8	11.2	14.2	17.3	20.6	295	418	532	648	771
Air / N_2 ratio	3.7	2.9	2.5	2.3	2.1	3.7	2.9	2.5	2.3	2.1

Dimensions*

Total length including end caps	1345 mm	52.9"
External diameter of module tube	104 mm	4.1"
External diameter of module end caps	114.3 mm	4.5"
Weight	12 kg	26.5 lbs
Connectors**	Air and nitrogen connections: ½" O_2 off-gas connection: 1½"	

* Definitive housing data are available in the assembly drawings.
** Available in BSPP and NPT (NPT dimensions differ slightly)



® registered trademark

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