

PRISM[®] Nitrogen Systems for Oil-and-Gas Operations and Marine Applications



Nitrogen Membrane Gas Separation Systems



Air Products AS (APAS) - Norway is an engineering and manufacturing company, specialized in nitrogen gas production and processing systems for marine and oil & gas applications. Founded in 1970, and the first manufacturer installing Membrane Nitrogen Generator offshore, APAS Norway is the “Competence Centre” for deployed membrane nitrogen systems. With worldwide presence, APAS is an integrated part of the global operations within Air Products and Chemicals, Inc.

APAS Norway has a global service network staffed by highly qualified system supervisors, strategically located to ensure quick and efficient response to any technical needs.

Enhanced Safety

Nitrogen gas is used for a variety of applications, with many related to safety. Nitrogen is used to inert potentially explosive environments in tanks and piping systems.

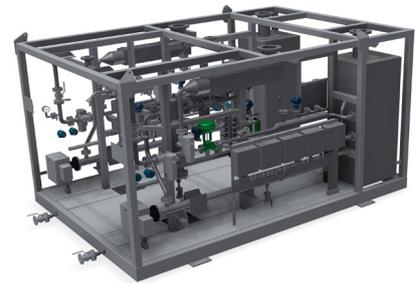
Fuel, oxygen, and a source of ignition are the three components necessary to support combustion. In petroleum transport or storage, the formation of hydrocarbon vapor is difficult to control and the sources of ignition are difficult to eliminate, so lowering the oxygen content to a safe level with nitrogen is a practical solution in creating a fire-safe environment.

Employing a PRISM Membrane system ensures that an abundant supply of nitrogen is always available to meet the demands of each specific application.

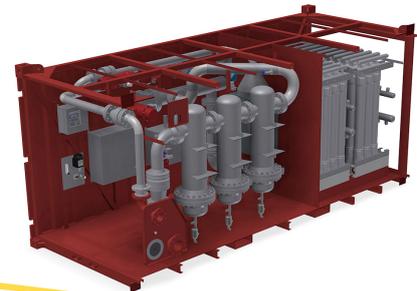
Production Flexibility

PRISM® Membrane systems are designed for nitrogen flow rates in the 25-12,000 Nm³/h (~880-440,000 SCFH) range. The nitrogen purity is typically 95-97% with capability to produce up to 99.9%.

Membrane productivity increases with rising pressure so a small system at high pressure can do the job of a larger system at lower pressure. Typical feed pressures range between 7 and 13 BARG, but it is possible to operate PRISM Membrane systems from 5.5 to 20 BARG. This allows engineers to optimize systems to maximize compressor efficiencies, balancing the power and space requirements in each application.



Membrane assemblies and filtration with required instrumentation and control systems can be skid mounted or containerized to meet the needs of your facility. Pre-fabricated, modular components are available in addition to custom-engineered systems. Components can be modified to meet specific space and supply requirements.



Example of a single generator two-skid system for onshore or offshore use.

Nitrogen Applications

- Purging of flare systems and atmospheric vents
- Back-up purging of flare system
- Seal gas on export gas compressors
- Purging of pig launchers and receivers
- Leak testing, gas-freeing and oxygen-freeing
- Regeneration of glycol in dehydration systems
- Heave compensation systems
- Oxygen stripping from injection water
- H₂S stripping from produced oil/water
- Drying confined areas
- Instrument air/gas
- Down-hole nitrogen services
 - gas lift
 - coiled tubing
 - cementing
 - well work-over
- Inert purging and blanketing of:
 - low flash point chemical storage tanks
 - methanol storage tanks
 - diesel day tanks
 - seal oil tanks
 - lube oil tanks
 - heating medium tanks
 - injection water tanks
 - slop oil tanks



Replacement PRISM Membrane separators are stocked in the Kristiansand office and ready for shipment anywhere within 48 hours.*

Contact the After Sales department for more information.

PRISM Nitrogen systems.

Each of the PRISM Membrane systems incorporates proprietary membrane gas separation technology, recognized as one of the most efficient and effective nitrogen generation methods available. Over three decades of experience building membrane-based systems has proven their durability.

A worldwide service network is available for shipboard units, ensuring that systems are running at optimum efficiency. Factory-trained, qualified technicians are available to get things running smoothly, minimizing costly down time.

How Membranes work

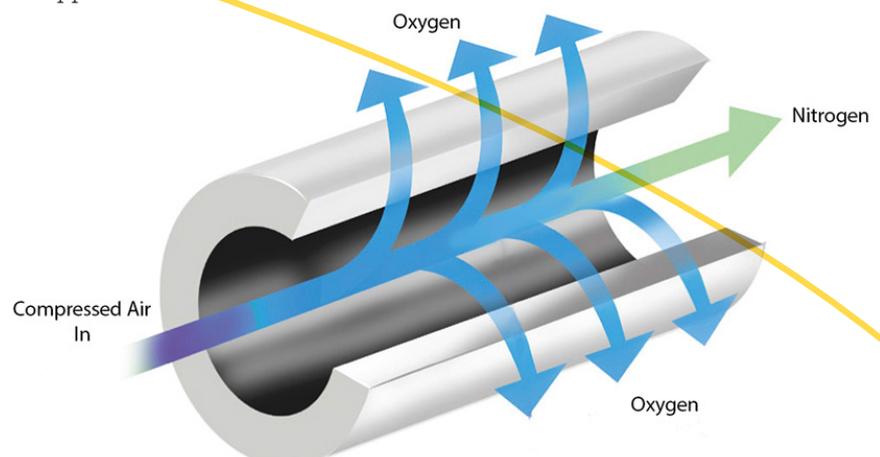
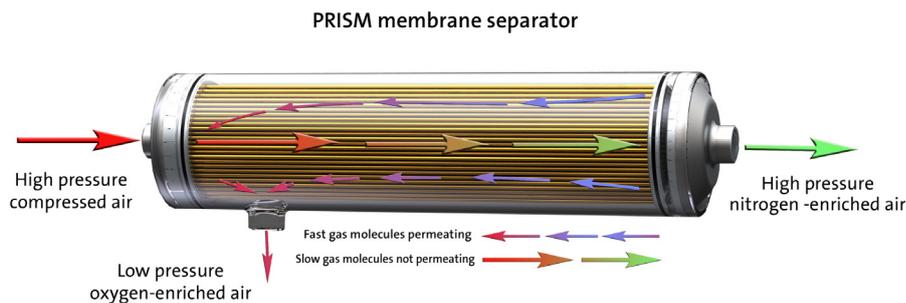
PRISM Membrane separators are used to generate the nitrogen in these systems. Each separator consists of a bundle of hollow fibers in a cylindrical shell. Compressed air is fed to the inlet of the separator and flows inside the hollow fibers towards the opposite end. Molecules migrate through the walls of the fibers according to their permeability: Oxygen, carbon dioxide and water vapor permeate through the membrane walls more quickly

producing a dry nitrogen stream at the outlet. The secondary oxygen-rich stream is vented through a port in the shell wall.

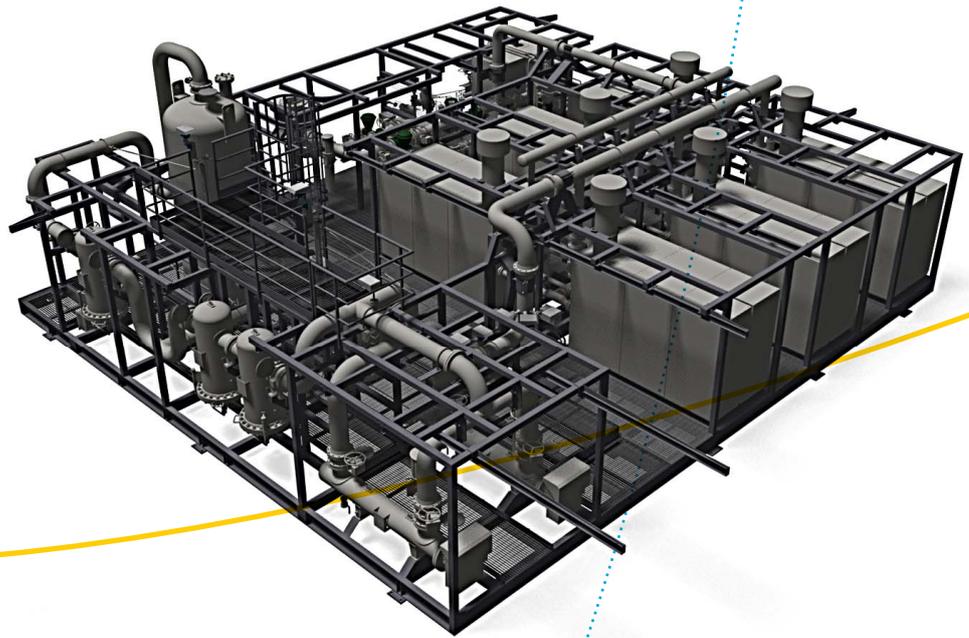
Each gas has a characteristic permeation rate which is a function of its ability to dissolve and diffuse through

a membrane. This characteristic allows “fast” gases, such as oxygen, to be separated from “slow” gases like nitrogen. The driving force of the separation process is the differential partial pressure which is created between the compressed feed air side and the low pressure side of the membranes.

Air contains nitrogen (78%), oxygen (21%), plus other gases, like argon, helium, and water vapor (1%). PRISM Membrane systems use this unlimited supply of raw material to produce nitrogen for a number of industrial applications.



APAS built the nitrogen system employed in one of the world's largest floating LNG processing platforms. This system incorporated more than 900 individual membrane separators which were fabricated onto modular skids for easy transport and installation.



For more information regarding nitrogen systems for offshore and shipboard applications, please contact our Customer Service and Sales specialists.

Air Products AS Norway

P.O. Box 4103, Kongsgaard
N-4689 Kristiansand - Norway
T: +47-38 03 99 00
F: +47-38 10 01 20
norway@airproducts.com

N2E - Offshore Sales Department

T: +47-38 03 99 77
F: +47-3810 01 20

After Sales Department

T: +47-38 03 99 58
F: +47-38 10 01 20
aftsskrs@airproducts.com



*48 hour order processing during normal business hours. Does not include weekends and holidays.

Air Products AS commitment with respect to any systems described herein or any warranty relating thereto shall be set forth exclusively in the contract of sale between Air Products AS and the customer. The information set out in this brochure is for preliminary information only and is not intended to constitute any representation or any warranty by Air Products AS to potential customers or to form the basis of a contract with any customer. Air Products AS makes no guarantee of satisfactory results from reliance upon information or recommendations contained herein and disclaims all liability for any resulting loss or damage.

The information contained in this document is believed to be true and accurate at time of publication. Air Products AS reserves the right to change product specifications without notification.

PRISM is a registered trademark of Air Products and Chemicals, Inc



tell me more
www.airproducts.no