

Excellence in Application

Controlled Atmosphere Solutions

Using PRISM® Membranes



Scenario – A banana grown in Central America is sold at a market in London. Think about that tremendous journey. The banana is transported from a plantation onto a ship and trucked to its final destination. This process is time consuming, and all the while, that banana is ripening and aging . . . who wants to buy brown, spoiled bananas at the market?

Over time, fruits and vegetables ripen and age, some faster than others. Reducing the amount of oxygen around the produce has proven to slow down the ripening process. This method of monitoring and managing the gases surrounding the produce is known as Controlled Atmospheres, and is very beneficial for delicate foods that cannot undergo freezing preservation. In the food industry, the ultimate benefit of a Controlled Atmosphere is distribution flexibility of time-sensitive goods. This gives shippers and distributors a much appreciated time cushion throughout the long distance journey of those bananas.

Development

The idea of preserving valuable produce by controlling the atmosphere is not new. In the early 1900's, the first systems used fans to circulate air over absorbent materials to increase their lifespan. Fortunately, a more advanced technique is used today.

Solution

Air Products has developed a technology to create controlled atmospheres for produce transportation and storage. Feeding nitrogen into an airtight storage space reduces the oxygen concentration and maintains the controlled atmosphere. The nitrogen for these systems is generated by Air Products PRISM Membrane separators. As opposed to traditional nitrogen sources like tanks or pipelines, membrane separators are one of the most effective and convenient supply of nitrogen for this application.

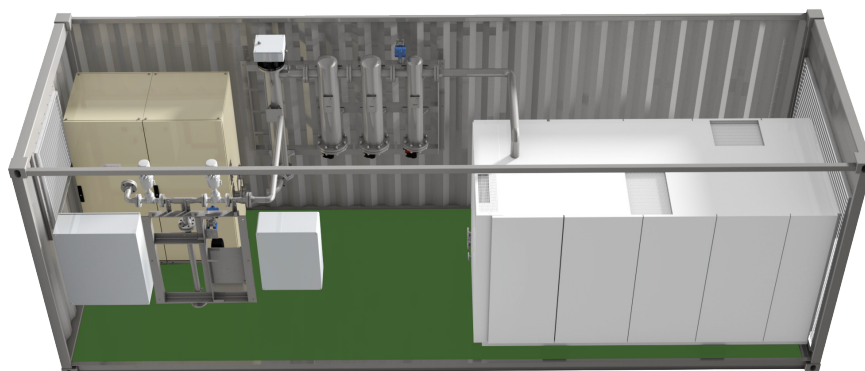
Air Products offers two different supply options for Controlled Atmosphere projects:

1. Fully engineered systems
2. Individual membrane separators for installation in an OEM-designed system

Engineered Systems for Controlled Atmospheres

System Features

For fully packaged Controlled Atmosphere systems, the Air Products Team located in Kristiansand, Norway provides customizable solutions. Compressors, controls, and nitrogen membrane separators are located inside standard shipping containers and house all of the necessary components to achieve the perfect nitrogen-rich environment. The nitrogen generated onsite flows into the cargo holds at 96% to 98% purity—all while being monitored by gas sensors.



Benefits and Details

Controlled Atmospheres extend the distribution period for high value commodities and remove some of the seasonality of certain produce. Growers enjoy more consistent sales throughout the year instead of intermittent profits due to harvest seasonality. The system containers are prepared and certified for seawater immersion and the nitrogen cabinets inside the container are DNV certified.

Experience

Air Products began engineering ship-board nitrogen systems in 1984 and has delivered hundreds of successful solutions since then. Decades of working side-by-side with shipbuilding, transportation, and food companies has provided Air Products with a significant amount of experience and expertise. Our membrane separators have a reputation of durability and long life since many systems have been in service for over twenty years.



Membrane Separators for Controlled Atmospheres

Features

The Air Products PRISM Membranes team (located in St. Louis, Missouri) works with Preferred Partners who design their own Controlled Atmosphere systems using membrane separators as the source of nitrogen. Using only compressed air, PRISM Membrane separators generate a stream of nitrogen—up to 99.5% purity. Membrane separators are available in a variety of models and specifications. Partners will work together with the Air Products technical team to optimize the conditions of the Controlled Atmosphere system and membranes.



Benefits and Details

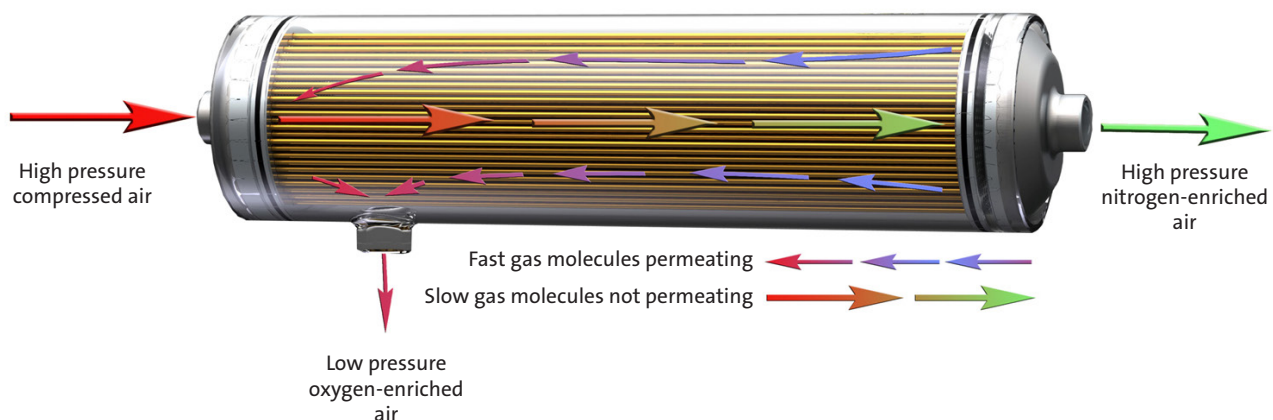
The most significant benefit of using membrane separators in a Controlled Atmosphere system, when compared to traditional nitrogen sources like pre-filled tanks or pipeline supply, is the convenience of onsite generation and mobility. PRISM Membrane separators are lightweight, durable, and easily moveable. They can be scaled up or down depending on the size of the Controlled Atmosphere system. The shell of the membrane separator is strong and protective in humid or warm environments. Some models are available in a stainless steel shell for additional protection, and all membrane products are manufactured in a facility which is ISO9001 and AS9100C certified.

How Membrane Separators Work

Each separator consists of thousands of hollow fibers with selectively permeable membranes, bundled inside a cylindrical shell. Atmospheric air contains approximately 78% nitrogen, 21% oxygen, 1% other gases. When compressed and fed into the separator, the molecules permeate the fiber at different rates and exit through separate ports. A high purity stream of nitrogen exits from one end, ready to blanket the fruits in the cargo hold while the oxygen-enriched air exits the other end and is vented off.

Allow Air Products to demonstrate excellence in application for your Controlled Atmosphere solution.

PRISM membrane separator



Contact Information:

For complete Controlled Atmosphere systems

Air Products AS (Norway)
P.O. Box 8100 Vågsbygd
N-4675 Kristiansand
S - Norway
T: +47-38-03-99-00
F: +47-38-01-11-13
norway@airproducts.com
www.airproducts.no

For individual membrane separators

Air Products PRISM Membranes
11444 Lackland Road
Saint Louis, Missouri 63146 USA
T: 1-314-995-3300
F: 1-314-995-3500
Membrane@airproducts.com
www.airproducts.com/membranes

“We operate five Controlled Atmosphere units in 40-foot containers which were built by Air Products in 1997 and 1998. These units have been used in various trades onboard ships in ocean going traffic. They were designed in close cooperation with the Air Products staff. We have also used the Air Products-designed smaller units to fit into airline containers. We are very satisfied with their knowledge, dedication and workmanship, and look forward to continued cooperation with Air Products to build new units for our Controlled Atmosphere containers.”

Ralph Mohlin, Fleet Department, NYKCool 2014

The information contained in this document is believed to be true and accurate at time of publication. Air Products PRISM Membranes reserves the right to change product specifications without notification. Please consult current *Product Design and Reference* manual for detailed information associated with these products.

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The Air Products PRISM Membranes Business Unit's quality management system is certified to ISO9001 and AS9100C.



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