

# ***Air Separation Technology— Structured Packing***

- > Maximum plant performance and energy efficiency*
- > Air separation and cryogenic hydrocarbon separation*
- > Optional pure argon production*
- > Wide range of applications*



*“Air Products’ patented structured packing technology, and proprietary liquid and vapor distributors deliver optimum column performance in high-capacity plants around the world.”*

Andy Weaver, ASU Distillation Technology Manager, Air Separation Product Supply Team





Air Products' structured packing delivers performance advantages that enable us to design and build shop-fabricated distillation columns that produce up to 7,000 MTD oxygen. Of course, we can install multiple trains to meet higher demands.

### ***Background: Innovative design for optimum performance and energy efficiency***

The bigger the application, the more critical it is to control capital and operating costs. Choosing the optimal configuration of distillation column components helps minimize these costs. Air Products' patented structured packing technology enables energy-efficient, high-performance distillation columns for both air separation and cryogenic hydrocarbon separation. Air Products pioneered the use of structured packing in air separation as early as 1984. Our research indicated that packed columns could provide significantly better performance and lower power consumption than sieve trays. Plus, the use of structured packing makes it possible to make pure argon by distillation, eliminating the need for a source of hydrogen to remove low levels of oxygen from the argon product. We installed packed columns in 1,000 T/D plants in LaPorte, Louisiana, and Rozenburg, the Netherlands. In 1989 we received the first of several patents for our packed columns. Since we introduced packed columns into air separation, packing has become the industry standard. We have deployed our proprietary structured packing in more than 190 operating plants around the world, and we have operating experience with packed columns exceeding 5,000 mm in diameter.

### ***Description: More surface area maximizes mass transfer***

Structured packing provides a large surface area per unit volume, which maximizes mass transfer performance and creates a lower pressure drop than conventional distillation trays. By reducing the pressure drop, structured packing increases energy efficiency. Together with our structured packing, we use our own proprietary liquid and vapor distributors to maximize distillation column performance.



Structured packing provides a large surface area that maximizes mass transfer performance in distillation columns.

## Proven performance

Around the world, we have deployed our structured packing technology for air and/or hydrocarbon separation in chemical processing, steel, gas-to-liquid (GTL), gasification and a wide variety of other applications. We test our structured packing over a wide range of operating conditions, and we can use test data to extrapolate performance to large column diameters. We test our proprietary liquid and vapor distributors and other components prior to commercial application. In addition, we test liquid distributors at our manufacturing facilities prior to installation, using proprietary software to analyze performance to ensure satisfactory operation in the field.

## Compare: Packed columns offer multiple benefits

Packed columns	Trayed columns
Lower pressure drop leads to significant power savings. (Greater than 5% reduction in power is possible.)	Higher pressure drop, but shorter columns.
High turndown capability. (Down to 40% of design capacity is possible.)	Limited turndown for efficient operation. (60-70% of design capacity is typical.)
Enables pure argon production by distillation, therefore eliminating need for a pure hydrogen source.	Can be used for high-pressure distillation.

## References: Rely on Air Products' experience

Air Products pioneered the concept of structured packing for distillation columns more than 20 years ago. We have engineering, constructing and operating experience with packed columns in a wide range of applications.

Start-up date (Year)	Customer	Capacity (MT/D GOX)
2006	Map Ta Phut Industrial Gases	180
2006	Oryx GTL QIP/Sasol	3,500 x 2 Trains
2006	Air Products/Wison/Celanese	1,645
2005	Lurgi/Methanex	1,613
2005	Xinfeng Steel/Air Products	617 + 340 LOX
2004	Air Products for Arcelor/Sidmar	960
2003	Methanex	2,800
2003	VCP	91
2002	Air Products/BP Chemicals	345
2000	Petronas	900
2000	GAS	2,000



We use our cryogenic test facility to determine the performance of our structured packing over a wide range of operating conditions.



### *For More Information*

We would welcome an opportunity to tell you more about the advantages of Air Products' structured packing technology and how it can benefit you. To learn more, contact us at one of the locations listed here.

#### **Americas**

Air Products and Chemicals, Inc.  
7201 Hamilton Boulevard  
Allentown, PA 18195-1501  
Tel +1-610-481-5319  
Tel +1-800-551-2995  
Fax +1-610-706-7273  
E-mail [ASUinfo@airproducts.com](mailto:ASUinfo@airproducts.com)

#### **Europe**

Air Products PLC  
Hersham Place Technology Park  
Molesey Road  
Hersham  
Walton-on-Thames  
Surrey KT12 4RZ  
United Kingdom  
Tel +44 1932 249071  
Fax +44 1932 258461  
E-mail [ASUinfo@airproducts.com](mailto:ASUinfo@airproducts.com)

#### **Asia**

Air Products and Chemicals (China)  
Investment Co. Ltd.  
East Wing, Floor 1  
Building #88, Lane 887  
Zu Chongzhi Rd.  
Zhangjiang Hi-Tech Park  
Shanghai, 201203  
P.R. China  
Tel +86 21 38962103  
Fax +86 21 50809831  
E-mail [ASUChina@airproducts.com](mailto:ASUChina@airproducts.com)

#### **Middle East**

Air Products PLC – Qatar  
Office no.12  
Faisalia Building  
P.O. Box 55294  
Suhaim bin Hamad Street, (C ring road)  
Doha, Qatar  
Tel +974 413 1052  
E-mail [ASUinfo@airproducts.com](mailto:ASUinfo@airproducts.com)

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