

PRISM® Oxygen VSA Systems



“PRISM® O₂ VSA's provide an onsite source of low-cost oxygen for lower purity applications. Low cost and reliability of supply are just two of the potential benefits of an onsite VSA versus trucked-in liquid”

*Kathryn Veluya,
Project/Product
Engineering*



Air Products has designed, engineered, manufactured and operated on-site gas generation systems for over 40 years, which has created an outstanding global product line.

Air Products' **PRISM®** Oxygen VSA Systems provide state-of-the-art technology in oxygen production. These systems offer a highly reliable supply of oxygen and can provide significant cost savings over trucked-in liquid. **PRISM®** Oxygen VSA systems are designed to satisfy customer needs over a broad range of volumes, pressures and purities. Standard features are available to meet the specific

needs of glass, metals, steel, cement, pulp and paper, waste water, and other industries. **PRISM®** Oxygen VSA systems use a patented high efficiency molecular sieve to selectively recover oxygen from air. This high performance sieve significantly reduces the energy required to generate oxygen, making **PRISM®** Oxygen VSA Systems the low-cost oxygen source for many applications.

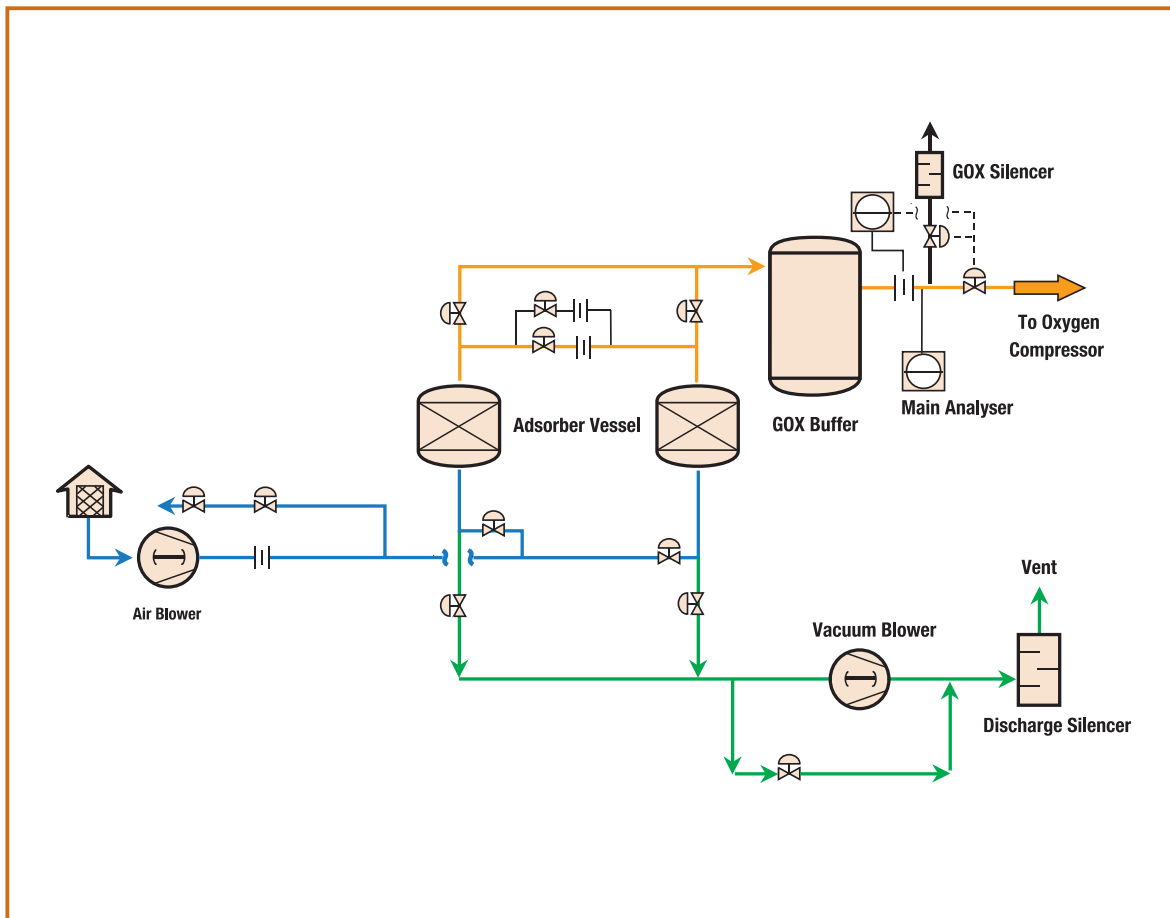
Features and Benefits

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|---------------------------|---|
| Low Capital Cost | <ul style="list-style-type: none"> • Highly skidded for low installation cost • Modular design for ease of relocatability • Minimum required plot space |
| High Reliability | <ul style="list-style-type: none"> • Fully automatic controls • Monitoring 24 hours per day, 7 days a week • Full local and remote control |
| Low Operating Cost | <ul style="list-style-type: none"> • Power-efficient gas supply • No utility water required • Designed for unmanned operation |
| Flexibility | <ul style="list-style-type: none"> • Efficient turndown to 50% of full capacity • Advanced sound abatement • Specific industry focus with superior integration of supply |

Process Description

The Oxygen VSA process utilised by these plants is a method of separating air into its two principal components – nitrogen and oxygen – using adsorption technology. The oxygen at 90% purity is provided to the customer as product, and the impure nitrogen combined with any water and carbon dioxide is vented. Oxygen VSA operation is a batch process and the flow of product off the adsorber beds is not continuous.

During a cycle, the adsorber vessel(s) are alternately pressurised with air to produce oxygen, then evacuated to regenerate the adsorbent and remove nitrogen. Uninterrupted, consistent oxygen flow to the customer is maintained from a product buffer tank that stores gas for the portion of the cycle during which oxygen is not being produced.



PRISM® VSA Performance

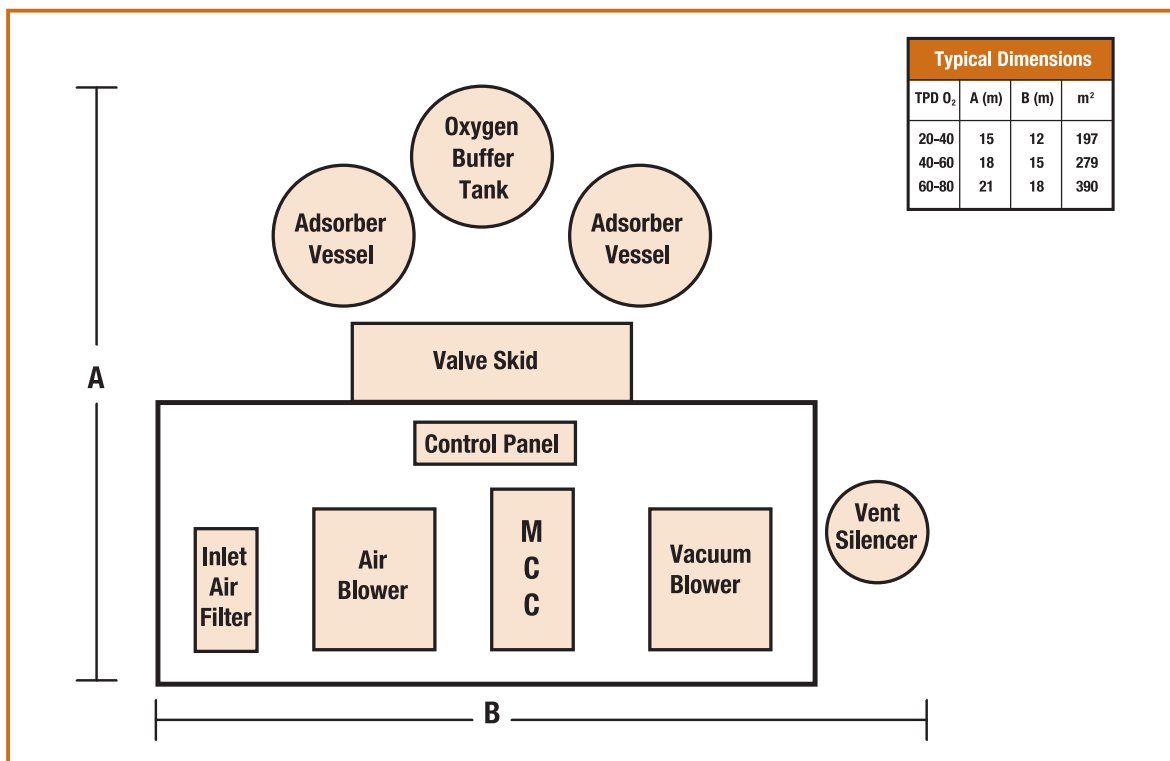
Air Products' VSA product line is capable of producing flow rates from 20-120 TPD at purities from 90-93% contained Oxygen. Turndown to approximately 50% of the flow rate of the equipment model is possible and provides a power saving benefit.

Options Available

Air Products offers a number of options to the standard PRISM® VSA System.

- Oxygen booster compressor systems
- Stand-alone instrument air supply systems
- 90-93% oxygen purity available
- Reduced voltage starting
- Efficient automatic turndown to 50% of full capacity
- Flexible layouts
- Fully-enclosed building for increased sound abatement
- Closed loop cooling skid for optional oxygen booster compressors
- Tight pressure control

Typical Plant Layout



Standards and Specifications

Safety, Health & Environment

Air Products believes that nothing is more important than safety.

We have extensive Safety Management systems, procedures (including HAZOP analysis) and detailed engineering standards, as well as 50 years of Air Separation plant operation experience. This expertise is applied to all plant and equipment that Air Products operates and sells, to ensure the safety of employees, customers and the general community. As a result Air Products is widely acknowledged to be the safety leader in the industrial gas industry and also has one of the leading performances in the chemical industry as a whole.

Quality

Air Products engineering and manufacturing operates under QA procedures that have been certified under ISO9001 since 1983.

Pressure vessels

Where allowed, ASME VIII is used as standard. Elsewhere, all other European and worldwide codes can be accommodated, including European PED.

Piping

ASME B31.3 as standard, DIN where Required.

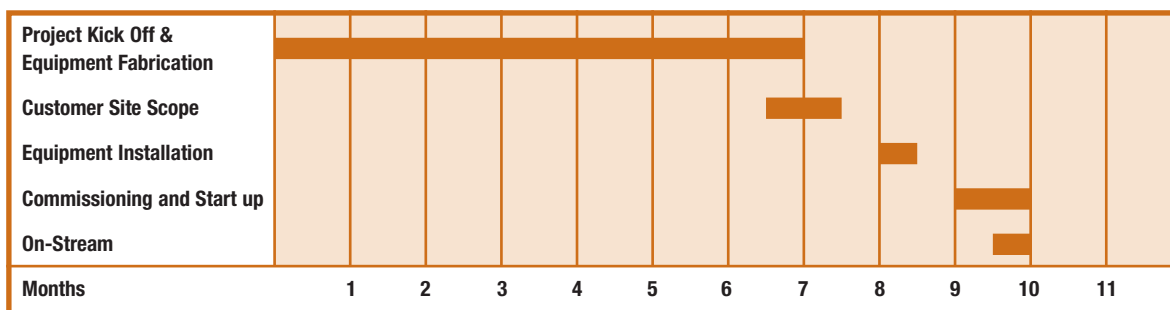
Electrics

IEC, CE plated as standard, NEMA where required.

Noise Level

85 dB(A) at 1 meter as standard, in a "free field" area with no other noise sources considered. Lower levels can be achieved where required.

Typical Project Schedule



Scope of Supply

Descriptions:

Air Products **PRISM**® System products have been designed to meet a wide range of applications in order to satisfy the requirements of each Customer. The scope of supply of each plant can be customised to address the needs of the Customer. Air Products also offers a broad complement of service options. These service options build on the base equipment package to provide a full product supply system, complete with ongoing operation, maintenance, and ownership of the equipment. An Air Products Commercial Manager would work directly with the Customer to identify the optimum level of service options.

Available service options:

- Licence and Permit Assistance
- Foundation Design and Construction
- Product Compression
- Equipment Delivery and Full Installation
- Utilities Design and Supply
- Startup and Commissioning of System
- Plant Overview and Safety Training
- Ongoing Operation and Maintenance
- Liquid Supply System for Backup & Peak shaving
- Product Pipe Line to Point of Use
- Application Testing & Optimisation
- Product Validation
- Remote Monitoring

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