

VSA TECHNOLOGY

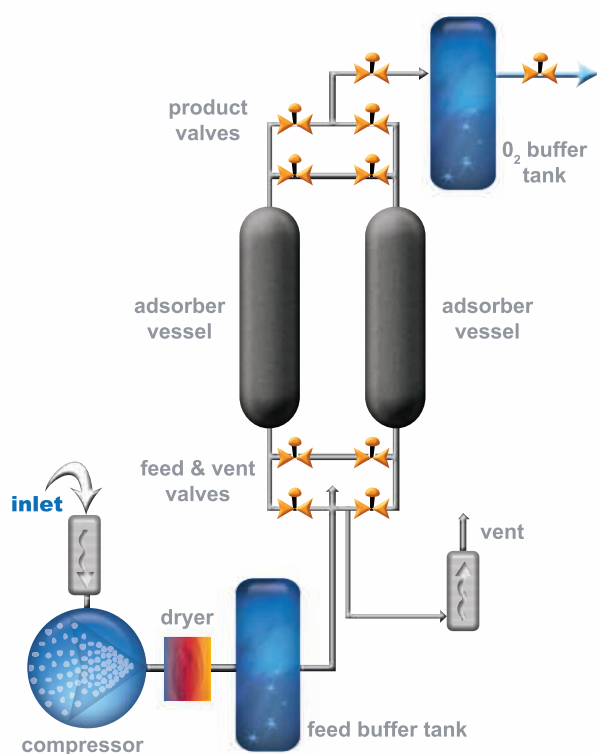
To produce oxygen from air, PCI uses a proprietary Vacuum Swing Adsorption (VSA) process that eliminates many of the design problems associated with traditional Pressure Swing Adsorption (PSA) systems.

Our innovative VSA system eliminates the need for process valves, feed air compressors, and associated dryers and feed air filtering systems.

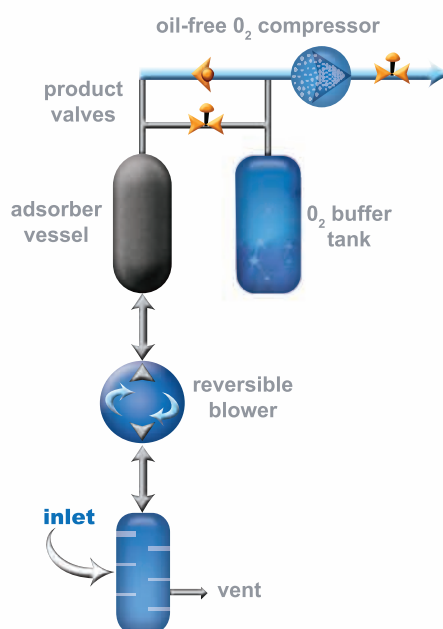
PCI's robust VSA process extracts maximum sieve and power efficiencies = low cost (both CapX and OpX) high purity oxygen generation.

Vacuum Swing Adsorption (VSA) vs Pressure Swing Adsorption (PSA)

COMPLEX PSA TECHNOLOGY



SIMPLIFIED VSA TECHNOLOGY



Keeping Track	PSA	VSA
Power (kWh / m ³):	1.6	0.8
Number of Main Components:	6	4
Number of Process Valves:	10	3

VSA Technology (continued)

Advantages of VSA over PSA Process Technology

PCI's unique Vacuum Swing Adsorption (VSA) technology has several advantages over the more commonly used PSA process:

- Uses an oil-free blower, thus avoiding any oil carryover common with oil-lubricated compressors - great for medical applications
- Lower operating pressure minimizes the potential for water condensation
- Not as susceptible to humid environments as are PSA systems
- Single-bed VSA process eliminates virtually all process valves and required manifolds
- Low operating pressure minimizes sieve dusting (the sieve removes the nitrogen from the air), because the pressure swing is an order of magnitude lower, resulting also in lower operating cost
- VSA Adsorber vessel has a much longer service life than PSA vessels - which commonly need repacking of sieve material every 3-5 years - again producing a much lower operating cost
- Shows no, or significantly less, degradation of performance at high altitude - unlike PSA technology
- Needs no feed air compressor (> 50% saving vs. conventional systems)
- Meets the USP 93% standard and can be as high as 95%
- Turn-key integrated solution—there is no need to size / source air compressors, dryer systems and product or feed buffer tanks

All of the above advantages reduce the cost of preventive maintenance and repairs, thereby reducing the operating cost.



PCI has manufactured thousands of nitrogen and oxygen generation systems for operation in the most demanding and remote locations on earth. PCI's products enable customers to produce oxygen and nitrogen at the point-of-use, effectively eliminating the logistical supply chain associated with delivered product.

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