AirSep PSA/VPSA Oxygen Systems

FOR COMMERCIAL APPLICATIONS

Pressure Swing Adsorption (PSA) and Vacuum Pressure Swing Adsorption (VPSA) Oxygen

1. Installed in China, this 50,000 SCFH (1,315 Nm^3/hr) AirSep VPSA oxygen plant serves a large, modern water treatment facility.

2. This system supplies oxygen to a central distribution system and fills cylinders intermittently for backup use. AirSep offers a wide variety of options to satisfy customer specifications.

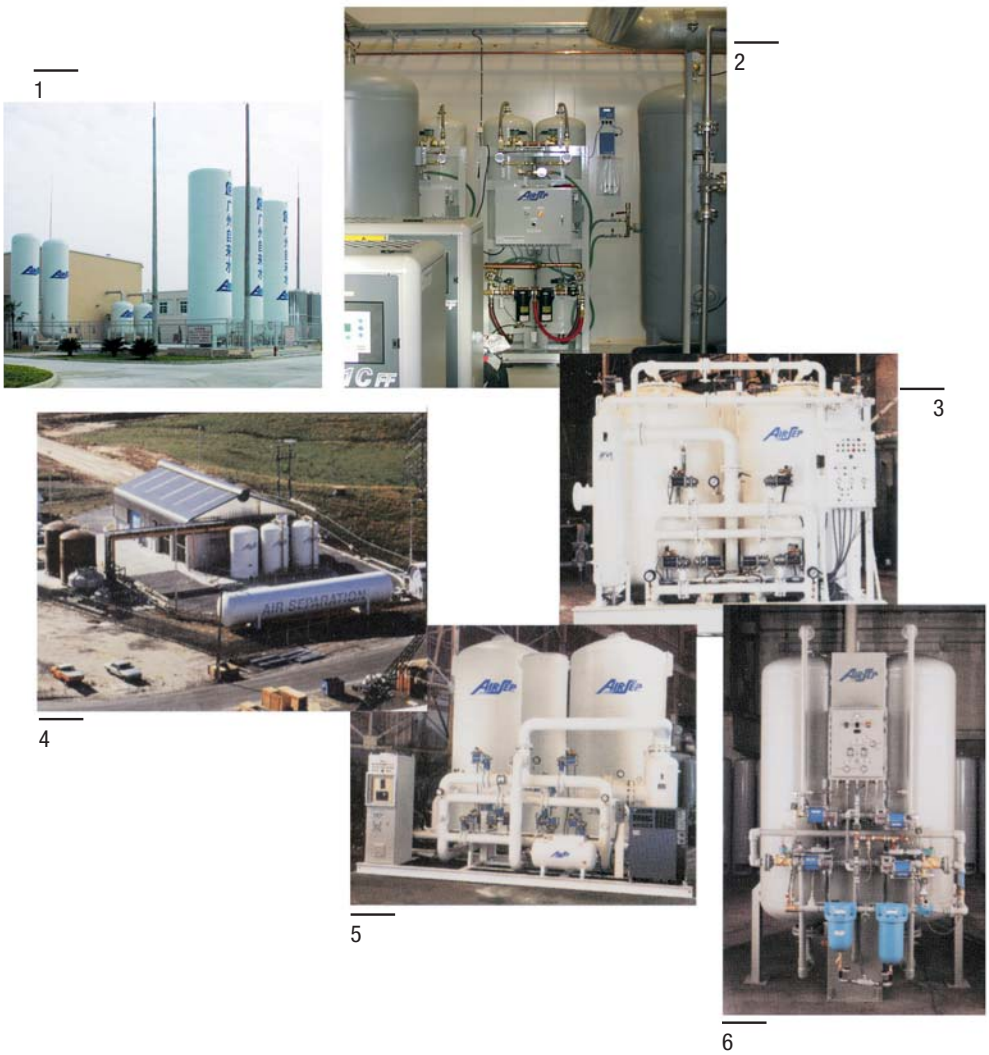
3. Producing oxygen for a gold leaching process, this plant generates 6,000 SCFH (157.7 Nm^3/hr). AirSep engineers design equipment for ease of installation.

4. At 42,000 SCFH (1,104.2 Nm^3/hr), this AirSep-built tonnage plant is the world's largest two-bed PSA oxygen system. In operation at a pulp and paper mill, it supplies oxygen for use in oxygen delignification and bleaching.

5. Supplying oxygen for an ozone process, this plant produces up to 20,000 SCFH (525.8 Nm^3/hr). In-house fabrication ensures on-time delivery and quality down to the last detail.

6. In use at a glass factory, this AS-1000 generator produces oxygen at a rate of 1,000 SCFH (26.3 Nm^3/hr). Oxygen generators with capacities up to 4,000 SCFH (105.2 Nm^3/hr) are fabricated in this configuration and shipped for unassisted start-up.

Air contains 21% oxygen, 78% nitrogen, .9% argon, and .1% other gases. AirSep® Oxygen Systems separate this small percentage of oxygen from compressed air through a unique Pressure Swing Adsorption (PSA) process. The PSA process uses molecular sieve (a synthetic zeolite), which attracts (adsorbs) nitrogen from air at high pressure and releases (desorbs) it at low pressure.



AirSep Oxygen Generators and Oxygen Plants use two vessels filled with molecular sieve as adsorbers. As compressed air passes through one of the adsorbers, the molecular sieve adsorbs the nitrogen. This allows the remaining oxygen to pass through and exit the adsorber as a product gas. Before the adsorber becomes saturated with nitrogen, the inlet air flow switches to the second adsorber. The first adsorber is now regenerated by desorbing the nitrogen through depressurization and purging it with oxygen. The complete cycle is then repeated. Under normal operating conditions, the molecular sieve is completely regenerative and will last indefinitely.

Tonnage Plants

AirSep Tonnage Plants generate oxygen at a nominal 93% purity. These systems offer automatic, unattended operation, touch-screen control with remote monitoring capabilities, low power consumption, and above 99% on-stream plant reliability. Standard product pressures range from 5 psig (34.5 kPa) up to 45 psig (310 kPa). Optional oxygen compressors are available to deliver the oxygen at pressures up to 3,000 psig (20,685 kPa).

PSA Tonnage Plants

From 4,000 to 15,000 SCFH (105-398 Nm^3/hr), AirSep can supply either low-cost, high pressure PSA systems or power-efficient, low pressure design PSA oxygen plants, depending on customer needs. Low pressure plants generate oxygen at up to 15 psig (105 kPa) and consume approximately 400 kWh per ton of total flow. High pressure plants generate a nominal 93% pure oxygen at up to 45 psig (310 kPa) without the use of an oxygen compressor. They consume approximately 750 kWh[1] per ton of total flow.

VPSA Tonnage Plants

From 10,000 to 80,000 SCFH (263-2,103 Nm^3/hr), AirSep supplies extremely efficient vacuum pressure swing adsorption (VPSA) oxygen systems. They consume approximately 240 kWh[1] of power per ton of total flow with an oxygen output pressure of 5 psig (34.5 kPa).

Purchase Options

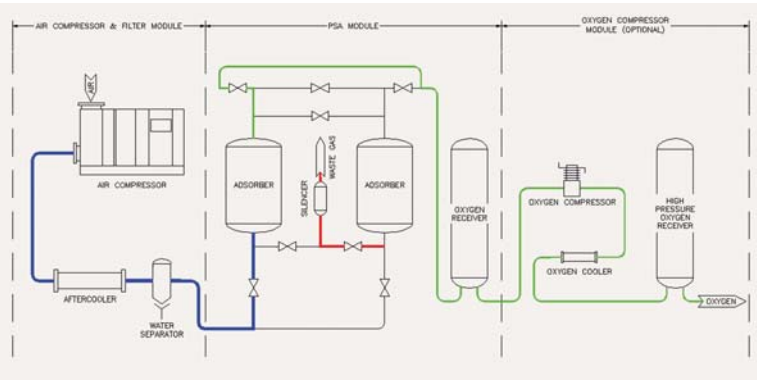
Customers can purchase turnkey oxygen plants or technical recommendations, including detailed drawings. In such cases, AirSep will also supply critical components (e.g valves, molecular sieve, plant controls, etc.).

The fabrication of adsorbers and piping can be accomplished locally under AirSep supervision. In addition, customer-supplied feed air equipment and/or oxygen compressors that meet AirSep specifications may be used. AirSep engineers direct the final testing and start-up of the plant.

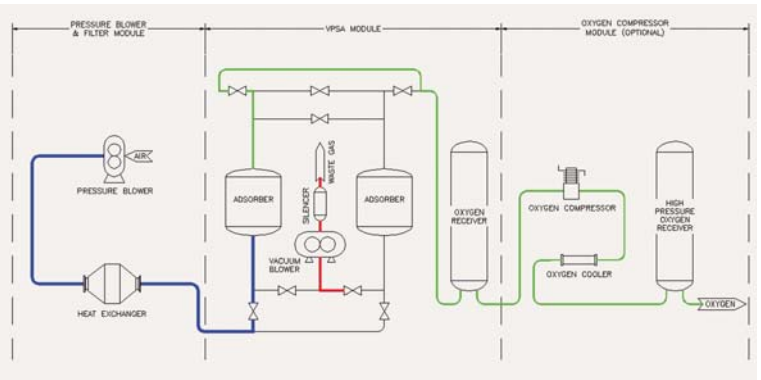
Easy Installation

AirSep designs oxygen plants for easy installation. The valves, manifolds, and plant controls are preassembled in our facility and delivered on site. Adsorbers are shipped separately for final on-site assembly. Plant assembly and start-up are normally completed in less than five days under the supervision of AirSep engineering.

PSA Tonnage Plants



VPSA Tonnage Plants



Technical Support

To assist customers in maintaining their oxygen plants in excellent operating condition, AirSep offers start-up service contracts. Under these contracts, AirSep technical specialists perform final turnkey maintenance as well as corrective service if needed.

[1] Power consumption based on per ton (2,000 lb) of total product generated.

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PSA Oxygen Systems

Standard Generators

AirSep Oxygen Generators eliminate the expense, inconvenience, hazardous handling, and storage problems often associated with purchased liquid or high pressure oxygen. The 12 standard models AirSep offers are the most efficient and dependable generators available today. These CE and CSA-approved units also achieve the lowest sound levels in the industry with their proprietary muffler.

Fully automatic, the generators require no specialized operating personnel. Simply connect an air compressor or shop air supply to the generator and your oxygen distribution system to the generator's oxygen receiver. Then connect the power cord to a grounded electrical outlet, turn the unit on, and set your oxygen delivery pressure. That's all there is to it. A simple on-off switch supplies oxygen whenever you need it.

Medical Oxygen Systems

AirSep Medical Oxygen Systems are designed to supply medical grade oxygen in accordance with USPXXII, CSA, HTM2022, and ANMAT specifications. The plants operate automatically and can be used for hospital pipeline supply, respiratory therapy, anesthesia, and for critical care units.

Packaged Systems

These skid-mounted, turnkey packaged oxygen systems are ideal for locations where a compressed air supply is limited or unavailable. All AirSep Standard Oxygen Generators can be packaged using customer-specified or AirSep-recommended components.

Cylinder Filling Plants

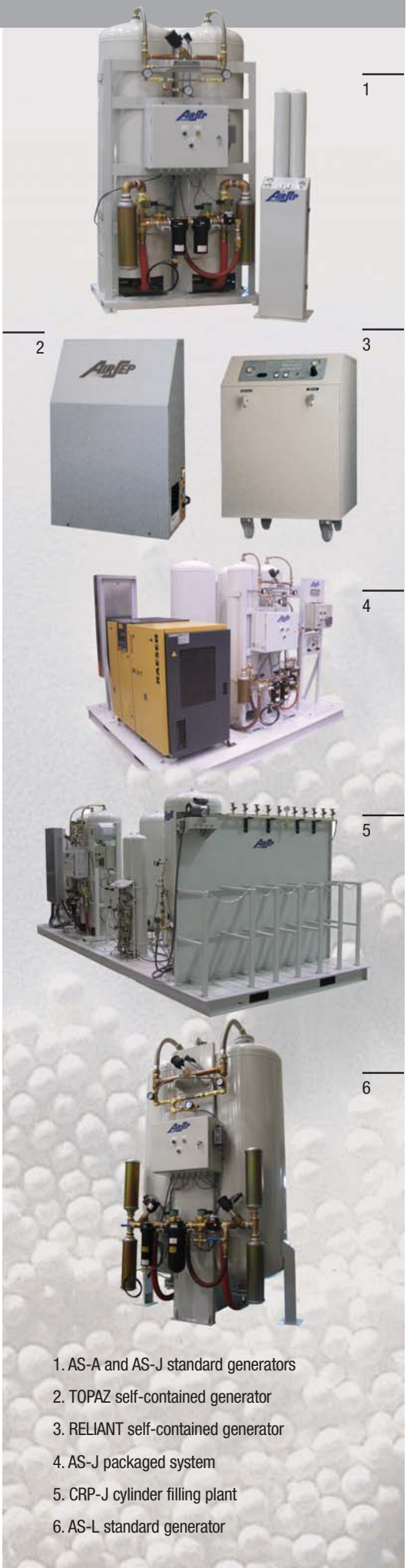
AirSep Oxygen Cylinder Filling Plants enable customers to fill oxygen cylinders for existing needs or to supply others. AirSep manufactures a complete line of turnkey oxygen cylinder filling plants — with capacities from 1 to 100s of cylinders per day. Complete plants include an oxygen generator, feed air compressor, feed air dryer, oxygen compressor, and cylinder filling rack. The oxygen compressor delivers oxygen at up to 2,200 psig (15,170 kPa) to a high pressure manifold capable of filling 4-10 cylinders at a time. These cylinder filling plants operate automatically and generate up to 95% pure oxygen. AirSep can also include a high purity module to enable any plant to produce oxygen at 99%.

Self-Contained Generators

For unique applications, AirSep offers five completely self-contained oxygen generators. Equipped with air compressors, these generators require no special installation. Simply connect the oxygen outlet to your oxygen distribution system and the power cord to a grounded electrical outlet. Turn the unit on and set your oxygen delivery pressure.

The Onyx and Topaz units are ideal for use where small quantities of oxygen at relatively low pressures are needed. They supply sufficient oxygen for ozone generation, jewelry manufacture, glass work, and various brazing applications. In comparison, the RELIANT is ideal for use in applications that require oxygen pressures of 12-50 psig (85-345 kPa) at 7 LPM.[1]

[1] 40 psig (275 kPa) maximum with 220 VAC/50 Hz power.



1. AS-A and AS-J standard generators
2. TOPAZ self-contained generator
3. RELIANT self-contained generator
4. AS-J packaged system
5. CRP-J cylinder filling plant
6. AS-L standard generator

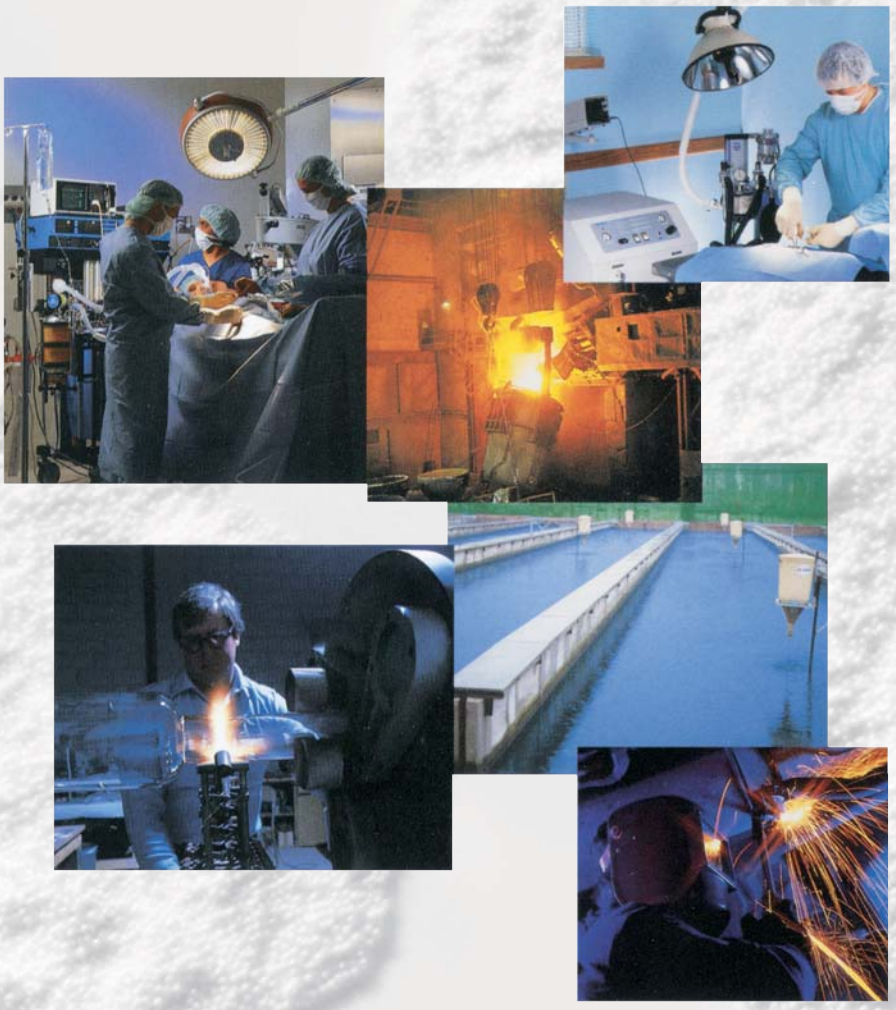
Why AirSep PSA Oxygen?

- **Standard & Custom Designs**
  Systems meet customers' application requirements.
- **Quality-Assured**
  Fabricated in accordance with all relevant codes (e.g., ASME, ANSI, CSA, CRN, NEMA, NYCFD).
- **Engineering Excellence**
  AirSep engineers instrumental in early PSA oxygen research. AirSep leads current PSA technology development and refinement. Over 50 patents held worldwide.
- **Energy-Efficient**
  World's most energy-efficient two-bed PSA oxygen process. Generates oxygen on site at less than half the cost of purchased oxygen.
- **Safe**
  Low pressure operation. Eliminates hazardous handling and storage of purchased liquid or high pressure oxygen.
- **Reliable**
  Built for years of continuous, trouble-free operation. Eliminates irregular deliveries of purchased oxygen.
- **Fully Automatic**
  Microprocessor-controlled for unattended operation.
- **Practically Maintenance-Free**
  Regular maintenance limited to normal air compressor upkeep and periodic replacement of oxygen generator filter element(s).

Supplying Diverse Applications

As a worldwide provider of PSA oxygen systems, AirSep supplies equipment for the simplest to the most sophisticated chemical and environmental oxidation processes. Whether at a medical, veterinary, or aquaculture facility, water treatment plant, muffler shop, or in an environmental process, the AirSep name symbolizes diversity.

AirSep excels as the leading supplier of PSA oxygen systems — worldwide — offering the most cost-effective, most efficient, and safest oxygen sources for today's diverse oxygen applications.



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