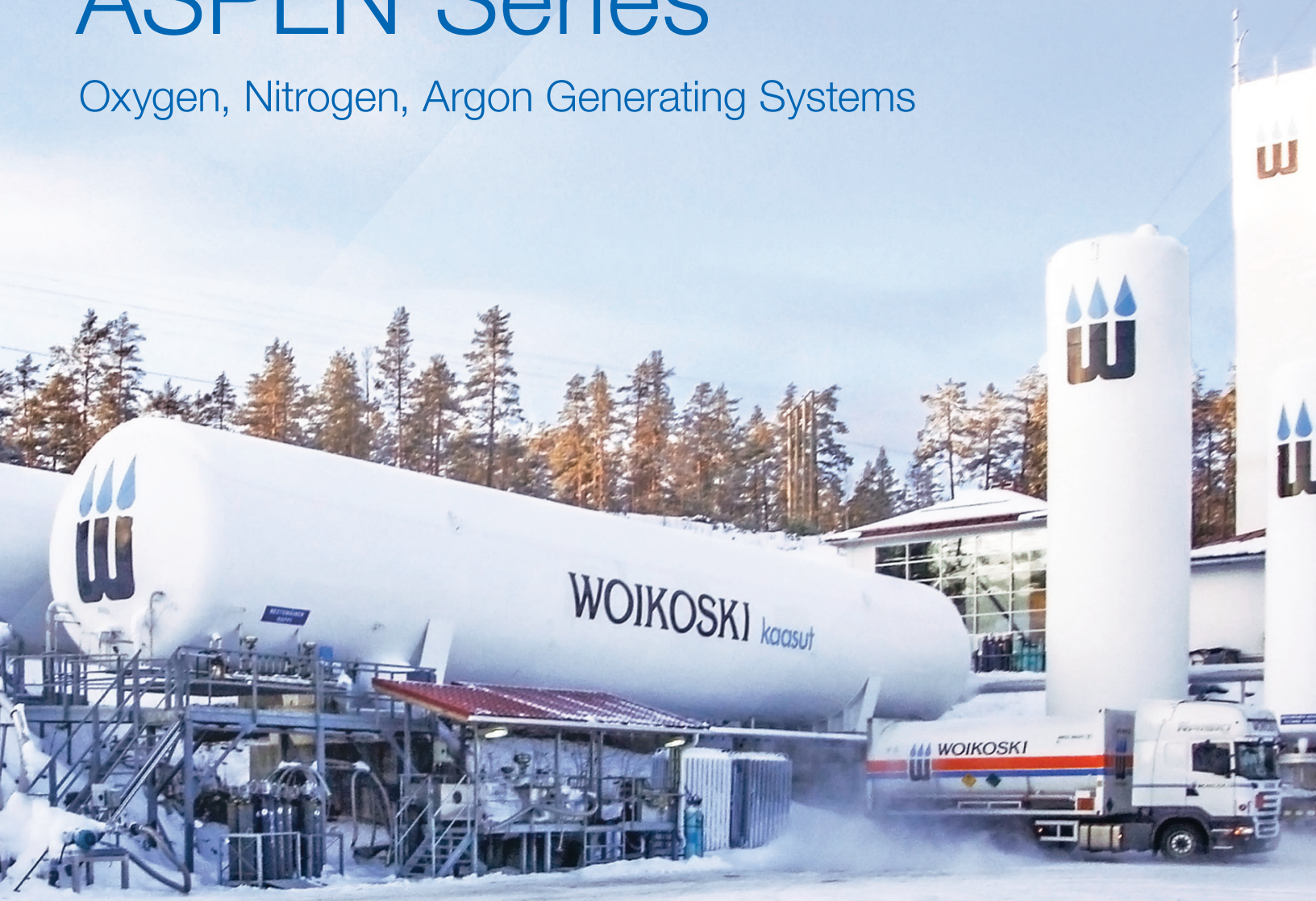
NIKKISO COSMODYNE

ASPEN Series

Oxygen, Nitrogen, Argon Generating Systems



Product Information

Built to the Highest Standards of Reliability and Efficiency

The ASPEN Series can produce a combined output of up to 1090 Nm^3/hr of liquid oxygen, liquid nitrogen and, as an option, liquid argon by cryogenic distillation of atmospheric air. In addition, up to 1350 Nm^3/hr of gaseous nitrogen is available on the ASPEN 1000 and 610 Nm^3/hr on the ASPEN 400 for liquefying, pipeline or other on-site applications.

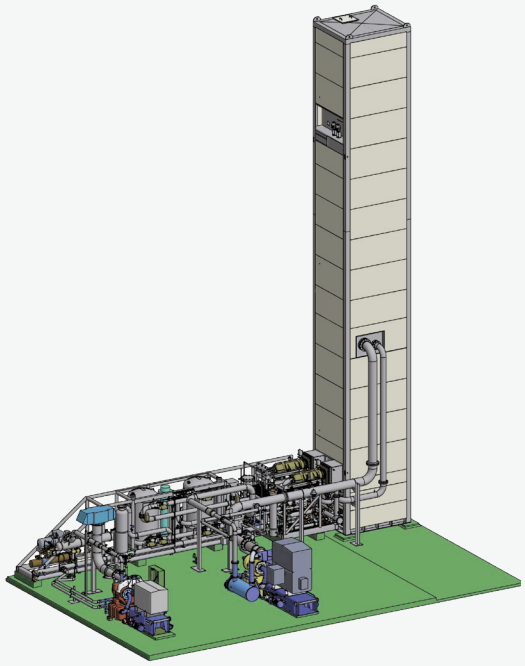
Built to the highest standards of reliability and efficiency, the ASPEN Series utilizes a modular design concept for rapid on-site installation, ease of shipping, handling and relocation. The plant systems are self-contained and can be completely installed outdoors, requiring only a simple foundation.

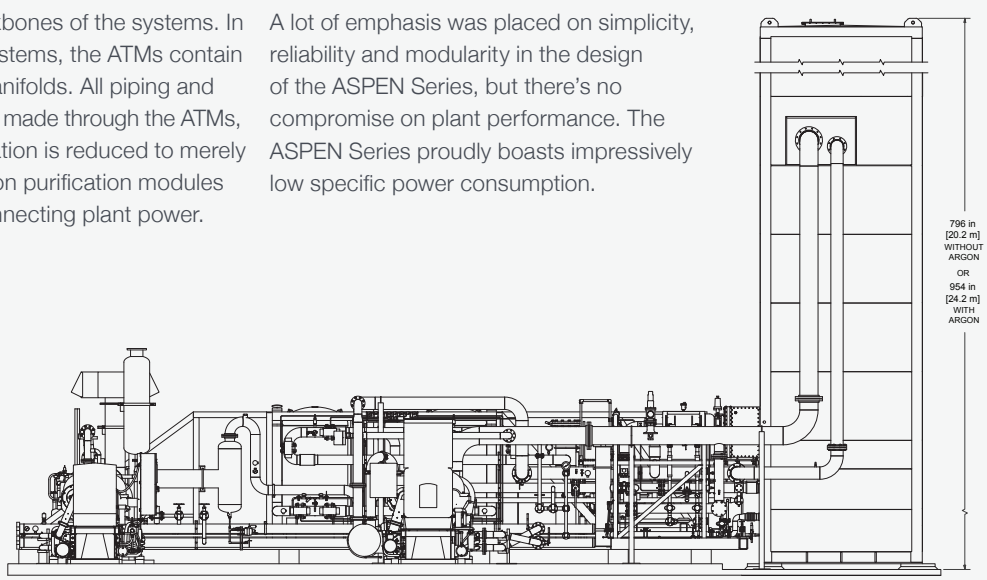
The air treatment modules (ATMs) are the backbones of the systems. In addition to the air clean up and refrigeration systems, the ATMs contain the master piping and electrical distribution manifolds. All piping and electrical connections between the modules are made through the ATMs, minimizing field piping and wiring. Plant installation is reduced to merely connecting the cold box modules (CBMs), argon purification modules (APMs) and cooling water to the ATMs and connecting plant power.

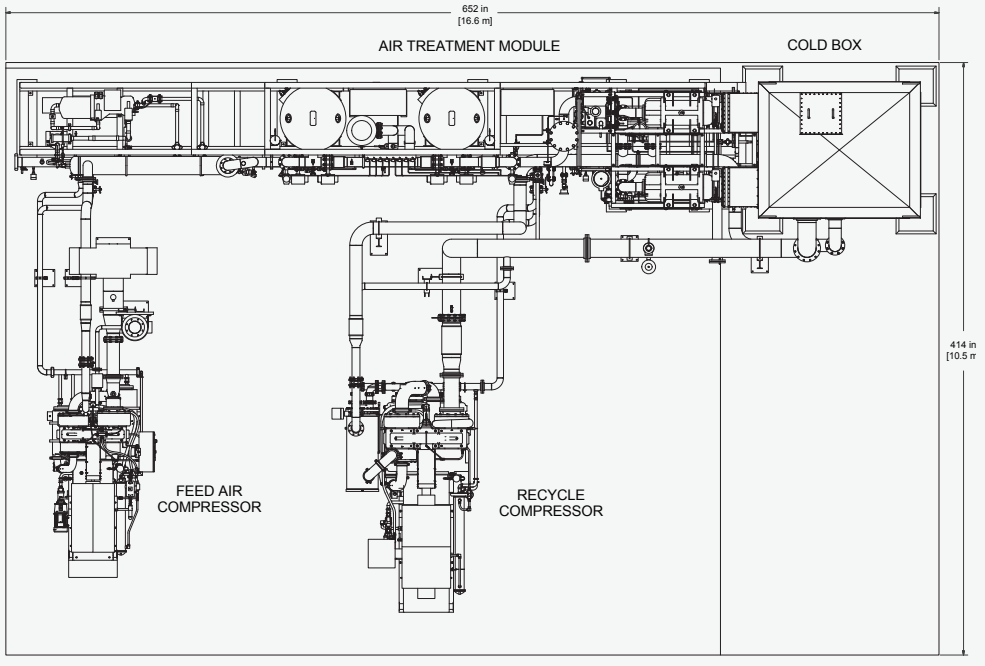
Since each plant is completely tested prior to shipment, commissioning time is minimal. Under normal conditions the plants can be installed and commissioned within 30 days after arrival on site.

ASPEN Series plants are configured with single feed and single recycle compressors or optional dual recycle compressors (ASPEN 1000 only). With the dual recycle option, all three compressors are identical and interchangeable to minimize spare parts inventory, maximize overall reliability and minimize start-up electrical load. In the event of feed air compressor failure, either of the recycle compressors can be crossed over to feed air function, providing reduced capacity production while repairs are being made.

A lot of emphasis was placed on simplicity, reliability and modularity in the design of the ASPEN Series, but there's no compromise on plant performance. The ASPEN Series proudly boasts impressively low specific power consumption.







Aspen Specifications

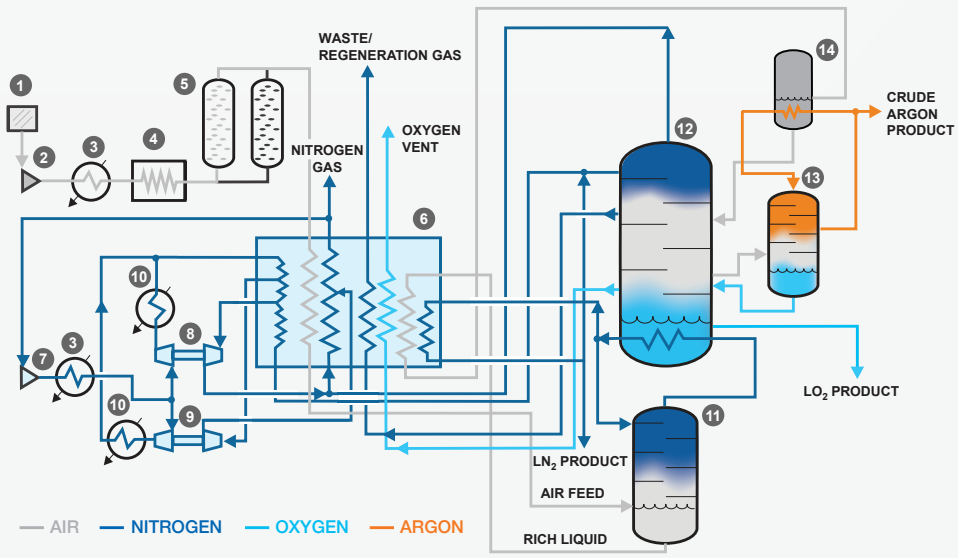
Plant Model		A1000		A400	
Operating Mode		**MAX LOX**	**MAX LIN**	**MAX LOX**	**MAX LIN**
Production					
Liquid Oxygen	Nm^3/hr	839	60	391	0
Liquid Nitroge	Nm^3/hr	182	1,030	62	465
Liquid Argon[2]	Nm^3/hr	27	0	0	0
Total Liquid Production	Nm^3/hr	1,048	1,090	453	465
Gaseous Nitrogen	Nm^3/hr	1,350	0	610	0
Purity					
Liquid Oxygen	$\%O_2$, min	99.6	99.6	99.6	99.6
Liquid Nitroge	ppm O_2, max	2.0	2.0	2.0	2.0
Pure Liquid Argon[2]	% Ar, min	99.999	–	99.999	–
Crude Liquid Argon[2]	$\%O_2$, max	2.0	–	2.0	–
Gaseous Nitrogen	ppm O_2, max	5.0	–	5.0	–
Plant Utilities Required					
Power	kW	1,262	1,249	675	675
Cooling Water					
Flow Rate	lpm	2,650	2,650	1,340	1,340
Temperature	*C, max	20	20	20	20
Specific Power[3]	kW-hr/Nm^3	**1.20**	**1.15**	**1.49**	**1.45**

1. Plant performance is based on standard atmospheric conditions (20°C, 50% RH, 1.0 atm barometric pressure).
2. Optional
3. Based on liquid products only.

Other Features of The ASPEN Series

- Cosmodyne PLC control system provides efficient, user-friendly graphic interface for remote, local or unattended operation
- Automatic control of all primary plant functions
- State-of-the-art analytical instrumentation package
- Dual, high performance turbocompressors with removable cartridge style rotating elements
- Proven molecular sieve type air clean-up system

Simplified Process Flow Diagram



1. Air Inlet Filter
2. Feed Air Compressor
3. Compressor Aftercooler
4. Air Chiller
5. Adsorbent Vessels
6. Main Heat Exchanger
7. Recycle Nitrogen Compressor
8. Cold Turboexpander
9. Warm Turboexpander
10. TBX Aftercooler
11. Nitrogen Column
12. Oxygen Column
13. Crude Argon Column
14. Crude Argon Condenser

Options and Accessories

- Crude Argon Production
- Refined Liquid Argon Production
- Nitrogen Liquefier
- Closed Loop Evaporative Cooling System
- 50 or 60 Hertz Electrical System
- Product Storage Tanks
- Cylinder Charging Systems
- Liquid Transfer Pump Systems

NIKKISO COSMODYNE

World leader in design and manufacture of modular air separation plants

Cosmodyne has been a world leader in the design and manufacture of modular air separation plants since 1977 with over 300 plants operating around the world.

Each Cosmodyne system is designed and built to rigorous standards of quality and workmanship developed from more than forty years of specific experience. From initial customer contact through on-site installation and commissioning, and well beyond, our sales, engineering, manufacturing and field service personnel continually demonstrate our commitment to customer satisfaction. Our worldwide service network stands by ready to serve you 24 hours a day.

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