

Production & efficiency improved with Cosmodyne's

Cosmodyne has modified its ASPEN 1000 model to create an air separation plant with greater capacity and increased efficiency.

Like its predecessor, the new ASPEN 1000 produces liquid oxygen, liquid nitrogen, and liquid argon for use in manufacturing processes worldwide. The new unit, however, contains a larger main heat exchanger, recycle compressor, and turboexpanders. As a result, it yields 10% more product than the original.

Efficiency was also improved by incorporating higher performance ACD turboexpanders and by rearranging the passes of the main heat exchanger. As a result, more energy is extracted from the process and power is reduced.

Another adjustment Cosmodyne made was to reduce the number of mechanical refrigeration compressors used in the air separation process. The original version was designed with three compressors: one for the air chiller and two in the recycle loop. By enlarging the heat exchanger,

recycle compressor and turboexpanders, and rearranging the passes of the main heat exchanger, the units used in the recycle are no longer required. Only one air chiller is needed, resulting in a more reliable system that is easier to maintain.

These improvements are complemented by the fact that the price for the ASPEN 1000 has not increased. Cosmodyne accomplished this feat by enhancing its manufacturing process, which allows it to keep costs to a minimum.

Despite the changes, the new ASPEN 1000 has retained the signature traits

THE NEW ASPEN 1000

- ▶ Increased capacity by almost 10%
- ▶ Lower specific power
- ▶ Improved reliability
- ▶ Fully factory tested
- ▶ Same competitive pricing

of the ASPEN line. The unit features a compact, modular design that simplifies shipping and installation, and allows for relocation if market conditions shift. It is self-contained, except for power and cooling water supply, and can be completely installed outdoors, requiring only a simple foundation.

The plant is pre-fabricated at Cosmodyne's facility and tested prior to shipping. Testing duplicates the conditions under which the plant will operate, and it can help to eliminate downtime or unforeseen delays once the plant reaches the customer's site. The plant's electrical frequency is not a testing concern since Cosmodyne is capable of testing both 50 Hz and 60 Hz systems.

Cosmodyne's ASPEN 1000, like all ASPEN models, operates using conventional cryogenic liquefaction and fraction distillation of atmospheric air. Using these processes, air is separated into its major components and liquefied by a conventional reverse regenerative Brayton cycle, combined with a multi-step distillation process.

After being filtered, air is compressed to approximately 7 bar (101 psi). An after cooler and chiller cools the compressed air to 5°C (41°F), which removes a majority of the water. After flowing through an adsorbent bed to remove carbon dioxide and remaining traces of water, the air is further cooled until it is partially liquefied. A system of distillation columns separates the air into purified nitrogen, purified oxygen, and crude argon.

The crude argon is further purified at ambient temperature with a catalytic converter and drier unit. Purified argon gas is returned to the cold box for final purification by distillation.

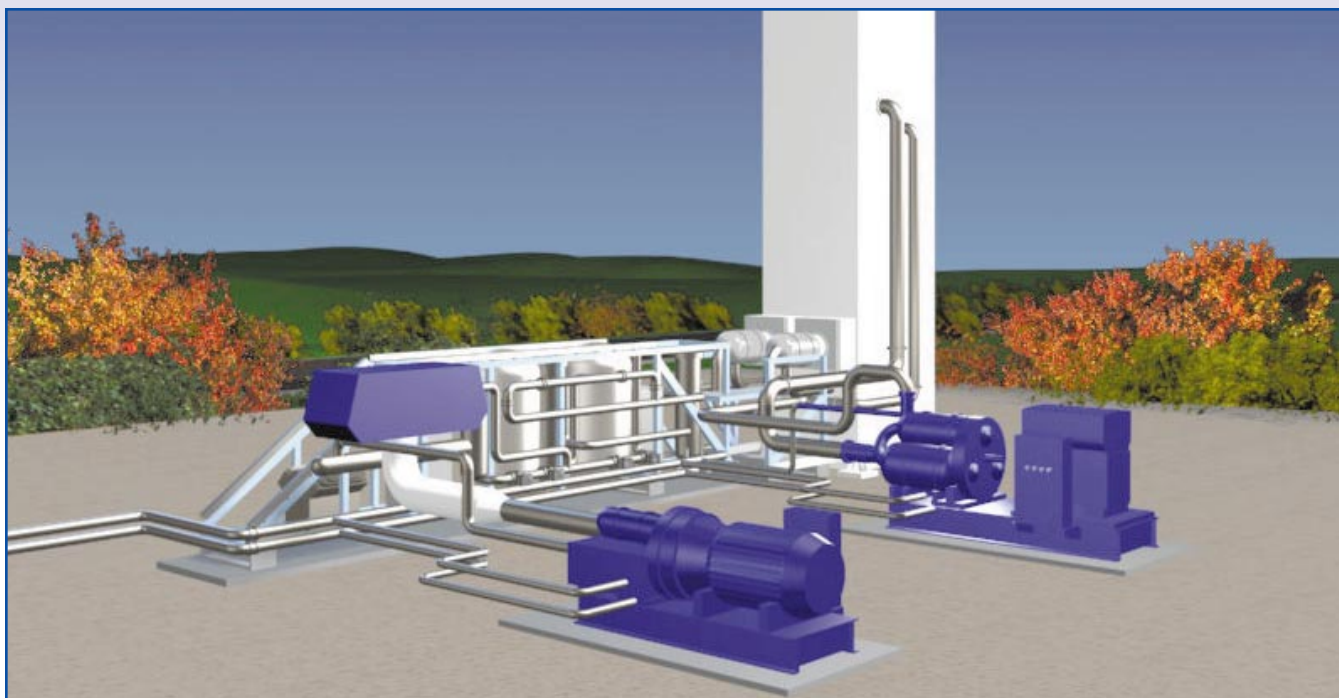
The recycled nitrogen refrigerant, at low pressure, is warmed to near ambient temperature before it is compressed in the recycle compressors to approximately 7



New ASPEN 1000 cold box being installed. The cold box houses the equipment that liquefies and distills the process air into liquid nitrogen, liquid oxygen and, optionally, crude argon. It also contains the main heat exchanger and distillation columns.

new ASPEN 1000

The new ASPEN 1000 air separation plant.



bar (101 psi). Compressed nitrogen, after recooling, is expanded in two turbines to produce liquid nitrogen. Part of the liquid nitrogen is delivered as product and the rest is used to liquefy the oxygen. Both are withdrawn as liquids.

Next, product is delivered to bulk users in liquid form or vaporized and compressed at high pressure (170 bars or 2465 psi) into cylinders. In some cases, nitrogen gas that is available as a byproduct while making liquid oxygen is supplied to pipeline customers or liquefied by a Cosmodyne companion liquefier.

Cosmodyne's ASPEN line also includes the ASPEN 2000 and ASPEN 400 models. ❄️

For more information about this line of air separation plants, contact George Pappagelis at Cosmodyne, tel +1.310.320.5650 or info@cosmodyne.com.

	Operating Mode Maximum Oxygen	Operating Mode Maximum Nitrogen
PRODUCTION		
Liquid oxygen	772 Nm ³ /hr (29.2 TPD)	49 Nm ³ /hr (1.8 TPD)
Liquid nitrogen	199 Nm ³ /hr (6.6 TPD)	953 Nm ³ /hr (31.5 TPD)
Liquid argon	19 Nm ³ /hr (0.9 TPD)	0 Nm ³ /hr
Total liquids	990 Nm ³ /hr (36.7 TPD)	1002 Nm ³ /hr (33.3 TPD)
Gaseous nitrogen	1350 Nm ³ /hr (47,674 scfh)	0 Nm ³ /hr
PURITY		
Liquid oxygen	99.6* % O ₂ min	99.6 % O ₂ min
Liquid nitrogen	5* PPM O ₂ max	5 PPM O ₂ max
Pure liquid argon	99.999 % Ar min	—
Crude liquid argon	2.0 % O ₂ max	—
Gaseous nitrogen	5* PPM O ₂ max	—
POWER	1307 kW	1293 kW
COOLING WATER	2650 lpm (700 gpm)	2650 lpm (700 gpm)
SPECIFIC POWER		
(based on liquid product)	1.32 kWh/Nm ³ (3.74 kWh/100scf)	1.29 kWh/Nm ³ (3.65 kWh/100scf)
<p>Note: Performance figures shown above are based on ambient temperature of 20° C (68° F), 50% relative humidity, sea level and 19° C (66° F) cooling water temperature. * Higher purity available.</p>		

New ASPEN 1000 Performance Specifications