

SPRUCE SERIES

7-31 METRIC TON DAY

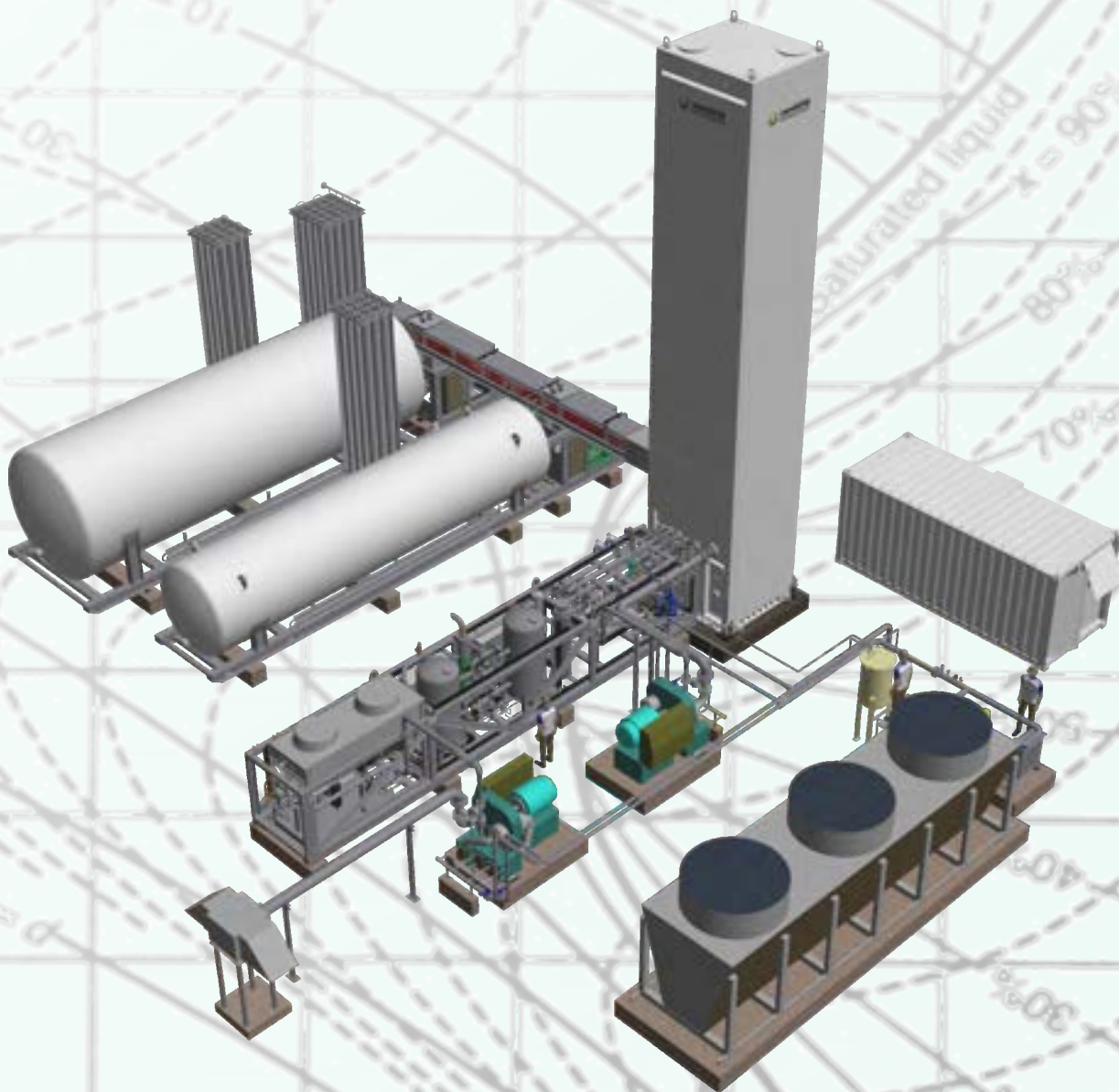
OXYGEN NITROGEN AIR SEPERATION PLANTS

The new benchmark for small OXYGEN AND NITROGEN air separation plants.

The Spruce plants are designed specifically to meet the challenge of ever-increasing global power and fuel costs while maintaining the high reliability and mobility of a modular design that are container shippable.

This innovative plant is built to meet the highest industrial gas safety and quality standards to ensure flawless and reliable performance under the most severe operating conditions.

Structurally ideal for emerging markets and remote locations, the Spruce plants phenomenal efficiency makes it equally suitable for more long-term production applications.



For enquires please contact

General Manager
Senior Engineer

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SPRUCE SERIES

Standard Equipment and Features

- High-performance ACD, low bearing loss, roller element bearing turbo expander with cartridge-style rotating element for easy removal and installation
- Roller element bearings allow excellent loss-of-power protection for rundown ideal for unreliable power supply
- Proven TSA air pre-purification system
- Efficient, reliable oil free centrifugal or dry screw compressors
- Choice of 50 or 60 Hz power systems
- Ships as three standard ISO containers to minimize transportation expense
- Complete with all interconnecting piping and electrical systems, ready for installation
- State of the art control system designed to allow unattended night-shift operation enabling remote optimization, problem solving and remote start-up as well as unattended startup
- Cold box and warm end lighting included
- Siemens S7 PLC Fully automatic digital process-control system with PC Based HMI

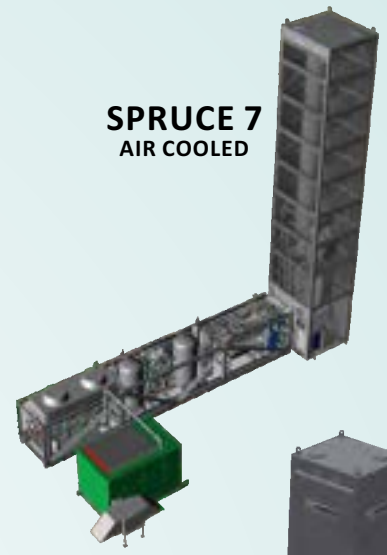
Options and Accessories

- CE compliance
- Factory cold performance Test
- Dry Cooling towers
- Integrated cylinder filling system
- ISO container Control Room
- Integrated product storage, high pressure pumping and transfer system
- Air cooled, evaporative water cooled or dry glycol cooling tower cooled

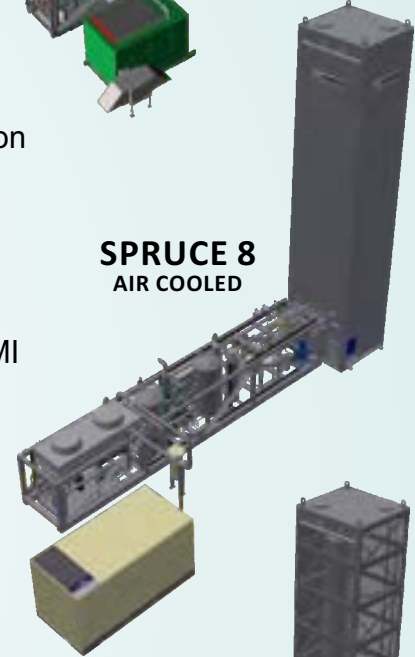
Services

- On-site or in-factory operator training
- Installation and commissioning assistance
- Extended warranty package
- Service package

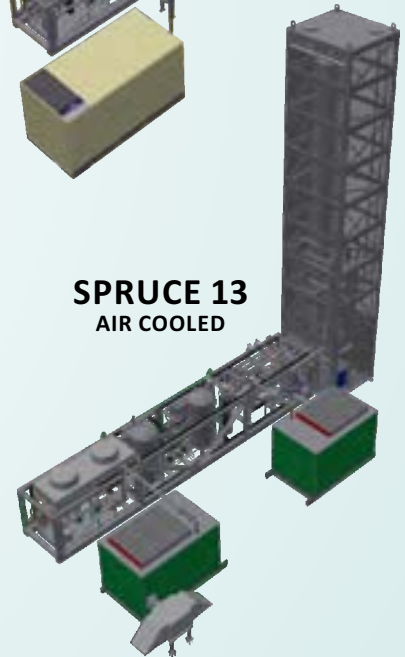
SPRUCE 7
AIR COOLED



SPRUCE 8
AIR COOLED



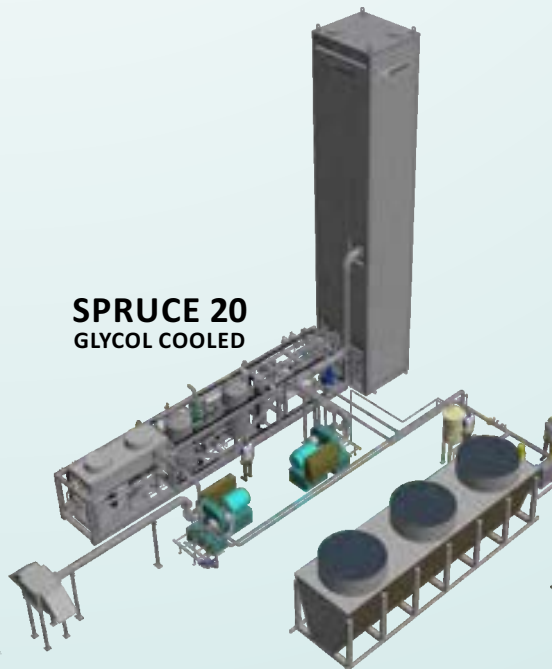
SPRUCE 13
AIR COOLED



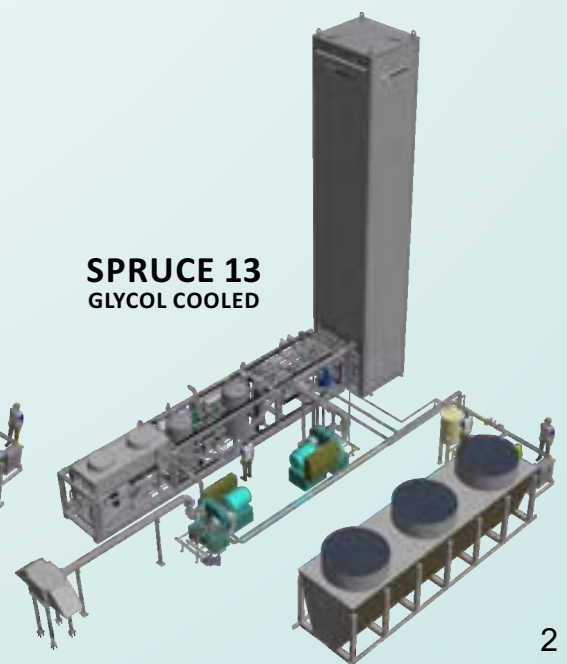
SPRUCE 30
WATER COOLED



SPRUCE 20
GLYCOL COOLED



SPRUCE 13
GLYCOL COOLED



SPRUCE PERFORMANCE



Design
 Barometric Press **14.7** psia Liquid N₂ subcooled to -188°C
 Dry bulb **26** °C Nm³/hr defined at 0°C 1 atm
 RH, % **70** % Multiple different split modes are possible
 Wet Bulb **22.72** °C
 Cooling water **29** °C

Model	Spruce 7		Spruce 8		Spruce 13		Spruce 13EX			Spruce 16		Spruce 20		Spruce 30	
OPERATING MODE	MAX LOX	MAX LIN	MAX LOX	MAX LIN	MAX LOX	MAX LIN	MAX LOX	SPLIT MODE	MAX LIN	MAX LOX	LIN GN	MAX LOX	LIN GN	MAX LOX	MAX LIN
Liquid N ₂	0.0	6.1	0.0	7.2	0.0	13.2	0.0	5.0	13.2	2.9	15.0	1.8	18.9	21.5	24.1
Gas N ₂							18.9	12.9	0.0	24.7	5.4	30.0	14.0		
Liquid O ₂	6.7	0.3	8.0	0.7	13.1	0.8	13.0	7.8	0.8	13.1	0.5	17.8	0.4	10.3	7.2
Gas O ₂	0.0	4.5	0.0	5.6	0.0	6.5	0.0	4.5	6.5	0.0	9.5	0.0	16.4	0.0	5.0
TOTAL PRODUCTS	6.7	10.9	8.0	13.5	13.1	20.4	32.0	30.2	20.4	40.7	30.4	49.6	49.7	31.8	36.4
TOTAL LIQUIDS	6.7	6.4	8.0	7.9	13.1	14.0	13.0	12.8	14.0	16.0	15.5	19.3	19.3	31.8	31.4
Liquid N ₂	0	203	0	241	0	440	0	167	440	97	500	60	629	718	804
Gas N ₂							630	429	0	822	183	1000	467	0	0
Liquid O ₂	195	9	232	19	381	22	380	227	22	382	14	519	12	299	211
Gas O ₂	0	131	0	163	0	189	0	131	189	0	277	0	479	0	146
TOTAL PRODUCTS	195	343	232	424	381	651	1010	954	651	1300	973	1579	1587	1017	1161
TOTAL LIQUIDS	195	212	232	260	381	462	380	394	462	478	514	579	641	1017	1016
POWER	381	381	449	463	608	614	608	608	614	696	696.1	893.6	893.6	1112	1124
SPECIFIC POWER (Gas+ Liquid)	1.95	1.11	1.93	1.09	1.60	0.94	0.60	0.64	0.94	0.54	0.72	0.57	0.56	1.09	0.97
SPECIFIC POWER (Liquid)	1.95	1.80	1.93	1.78	1.60	1.33	1.60	1.54	1.33	1.45	1.36	1.54	1.39	1.09	1.11
O ₂ LIQUID PURITY	99.6% O ₂		99.6% O ₂		99.6% O ₂		99.6% O ₂			99.6% O ₂		99.6% O ₂		99.6% O ₂	
N ₂ LIQUID PURITY	99.9% N ₂		99.9% N ₂		99.9% N ₂		5PPM O ₂ IN N ₂			99.9% N ₂		5PPM O ₂ IN N ₂		5PPM O ₂ IN N ₂	
N ₂ GAS PURITY	NA		NA		NA		5PPM O ₂ IN N ₂			NA		5PPM O ₂ IN N ₂		5PPM O ₂ IN N ₂	

Nitrogen purity to 1ppm O₂ in N₂ possible



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WARM END RIGGING



TSA DRYER CONTROL VALVES
lighting included pre-installed on all skids-



CHILLER SYSTEM



WARM END , WITH TURBINE DRYERS AND



ACD TURBINE WITH LUBE OIL AND SEAL GAS



POWER PANEL



PLC PANEL



WARM END



ADSORBER BED VALVES
WITH SOFT INSULATION



BRAZED AL HEAT EXCHANGER AND PIPING



COLD BOX GROUND LEVEL
VALVES AND INSTRUMENT
VALVES



CANNED CRYOGENIC VALVES



COLD BOX SHIPPED PRE-
FABRICATED AND INSULATED
WITH PERLITE, NO FIELD ACCESS



COLD BOX AND WARM END SHIP INSIDE
45 FOOT ISO CONTAINERS, COMPLETE
WITH ALL PIPING, INSTRUMENTS,
ELECTRICAL AND INSTRUMENTATION



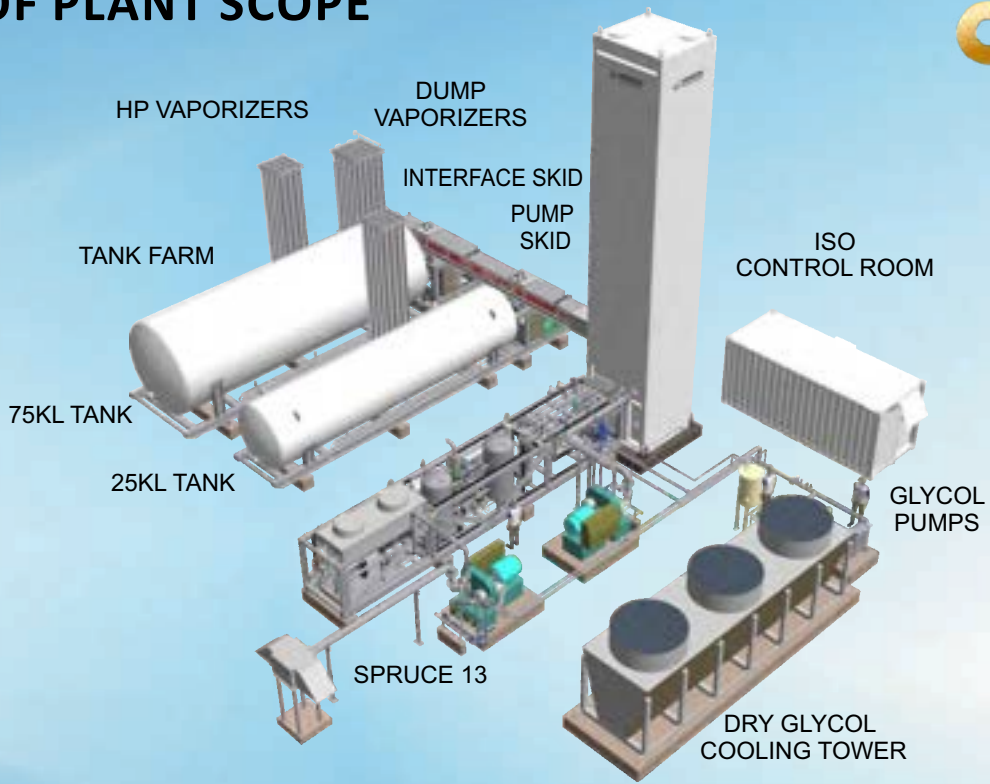
SIMPLE AND LOW COST CIVILS



ANALYSER PANEL



BALANCE OF PLANT SCOPE

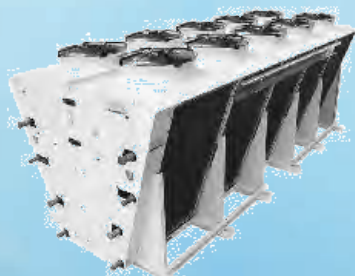


POWER DISTRIBUTION MCC
 SITE POWER DISTRIBUTION INSIDE
 A MODIFIED AND AIR CONDITIONED ISO CONTAINER

PREFABRICATED AND CONTAINER SHIPABLE
 BUILDING DESIGNED FOR PLANT



SHIPABLE ISO CONTAINER CONTROL ROOM
 AIR CONDITIONING AND INSTALLED ANALYSERS WITH LIGHTING, POWER,
 SOUND PROOF DOORS AND CLADDING



GLYCOL TO AIR DRY COOLING TOWER
 WITH PUMPS AND CONTROL, EXPANSION TANK

CUSTOMER PIPE LINE, BACK UP VAPORIZERS AND GAS COMPRESSION SYSTEMS

SPRUCE PRODUCT HANDLING AND STORAGE SOLUTION

Cosmodyne Packaged Plants offers a liquid storage, pumping and cylinder filling solutions.

The innovative, skid-mounted system is engineered for the safe and efficient storage of liquid Oxygen and liquid Nitrogen in low pressure horizontal tanks. The package facilitates remote process monitoring, automatic pump cool-down and loss of prime protection, inventory control, liquid pump transfer to road tankers, high pressure pumping and vaporization for cylinder filling, as well as off specification liquid disposal.

Efficient, versatile, moveable, safe, cost-effective

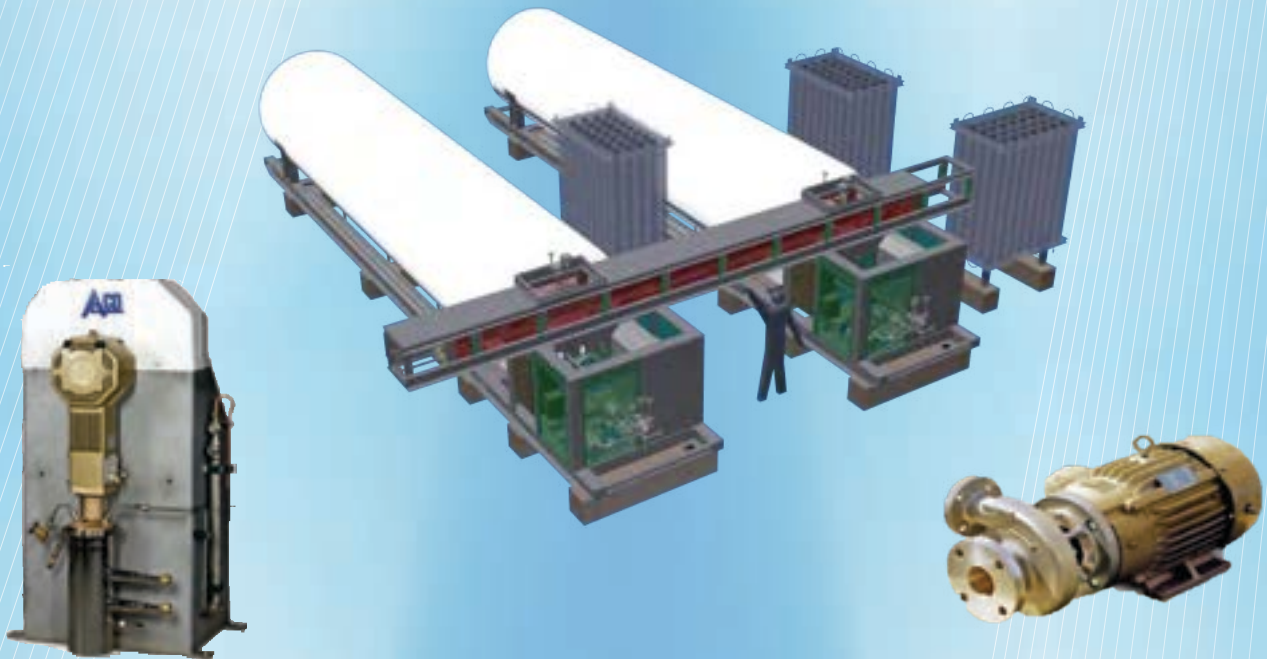
- Safe shipping and rapid deployment / relocation
- Ships in standard 45 foot high-cube containers
- Eliminates expensive on-site engineering and labor
- Interface skid provides product piping insulation with flexible product connections to all the skids.
- Single point electrical connection
- Single point control connection
- Lighting included
- Remote dial in for: problem solving
quality control
production trending
- IP55 dual door waterproof enclosures
- PLC automatic cool down and loss of prime detection for all pumps
- VFD control for the transfer pumps
- Rigorous testing at the point of manufacture
- Flawless and rapid commissioning in challenging or remote locations
- Independent control from main ASU plant PLC HMI
- Each Tank has a touch-screen HMI
- Safety as a priority, the system includes safety and vent valves
- Easy access for equipment maintenance
- The Oxygen pumps are fitted with Stainless Steel 6mm blast shields
- The tanks utilize gravity filling with vapor return lines
to the plant to minimize transfer and flash losses



TANK FARM

CUSTOMIZABLE SCOPE:

- A interface skid to tie all components together, for one or two tanks , transfer pumping skid, high pressure pump, HP vaporizer for cylinder filling and a dump vaporizer
- 25 /50 /75/ 100 m3 vacuum + perlite insulated horizontal type storage tank designed to ASME sec. VIII div. I Ed.2010 with "U" stamp certification. PED as a option
- ACD transfer pumps with VFD controls for road tanker or VIE filling
- ACD P2K cylinder-filling pump for cylinder filling features a vertical pump with a dual wrist-pin bearing design, allowing higher rod loading and greater drive-end life. Vacuum jacket at cold end minimizes the losses
- Customizable Vaporisers for Customer pipeline backup or HP Cylinder filling requirements
- A state-of-the-art Siemens PLC Control System with HMI touch-screen Electrical and PLC panels
- Tank has a pressure build-up coil to allow for pressure decants from the tank if necessary
- A VFD transport pumps
- Insulated Pump suction lines with aluminum weather-proof jacketing
- Independent liquid feed lines are provided to all pumps, facilitating separate operation of the Transfer pump and Cylinder Filling pump
- Interface between the plant PLC and the tank PLC system so that both systems can be viewed from either location
- The PLC includes the automatic cool down protection, loss of prime on both pumps as well as the tank level and pressure indication
- HMI screen incorporate a sun shield for easy viewing in bright environments
- The design includes safe disposal of liquid from safety and vent valves
- Easy access for equipment maintenance





Cosmodyne is a world leader in the design and manufacture of air-separation plants SINCE 1977, Each Cosmodyne system is designed and built to rigorous standards of quality and workmanship developed from nearly a half century of experience. From proposal to installation, our sales, engineering, manufacturing and field service personnel continually demonstrate our commitment to customer satisfaction.



This commitment does not end with delivery – our field service staff are ready to serve you **24 hours a day**, wherever you are. With over 450 functioning plants around the world we continue to set the industry standard for design, manufacture, sales and field-service.



Cosmodyne offers a wide range of plants under 300 metric ton/day. This brochure covers the smaller plants under 31 metric ton per day. Please contact us for any requirement over 31 metric ton/day



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