Phoenix Equipment Corporation
130 Maple Ave, Unit 4A, Red Bank, NJ, 07701
www.phxequip.com

Cryogenic Nitrogen Generation Plant - 6600 Nm³/h

Capacity: 3332 Nm3/hr per line
Products: High Purity Nitrogen

Major Equipment

- Air Filter
- Ingersoll-Rand Centrifugal Air Compressors
- Chiller Skid (Mechanical refrigeration)
- Air Treatment and Purification System
- Adsorbent Vessels
- Cold Box Module
- Automated Switchover Valves
- Regeneration Heater
- Adsorption Bed Particulate Filter
- Turbo Expander Module
- Start Up Nitrogen Tank (Shared)
- Cooling water system (Shared)
  - Pump skids
  - Cooling Towers
- Back-up Supply System (Shared)
  - Nitrogen Tanks
  - Ambient Vaporizers
  - Particle Filter
- Control System

Brief Plant Description

Unused never installed semi-automated cryogenic nitrogen generation plant designed for ultra-high purity gaseous and liquid nitrogen, built in 2024. The system consists of (2) TGN3700 Nitrogen Generators, (1) Cooling Water System, and one (1) Automated Backup System. A shared cooling water and nitrogen backup system ensures a reliable supply.

The two identical TGN-3700 Nitrogen Generators, each producing 3,332 Nm^3/h of gaseous nitrogen rated at 115 PSIG at 0°C, were designed by Cosmodyne, along with the Cold Box. Plant delivers nitrogen with extremely low impurity levels: oxygen at a maximum of 3 ppm, moisture at 3 ppm, total hydrocarbons (THC) at 1 ppm, carbon dioxide at 0.5 ppm, carbon monoxide under 1.5 ppm (with incoming air CO < 450 ppb), and hydrogen below 1.0 ppm (with incoming air H_2 < 280 ppb).

The process begins with Air Intake and Purification. Atmospheric air is drawn in, filtered, compressed by Ingersoll-Rand centrifugal multi-stage air compressors, and cooled to create "Feed Air." It is further purified by removing moisture, carbon dioxide, and particulates before entering the Cold Box Module (CBM). In the CBM, purified air is cooled in the Main Heat Exchanger (MHX) and sent to the nitrogen column for oxygen-nitrogen separation through distillation.

Air enters the nitrogen column as a two-phase stream. Rising vapor becomes nitrogen-rich, while descending liquid becomes oxygen-rich. High-purity nitrogen vapor is condensed for liquid nitrogen (LIN) or recovered as gaseous nitrogen (GAN) via the MHX. A turbo-expander (TBX) and MHX provide refrigeration. Waste liquid is sub-cooled, expanded, and reheated, with cold vapor aiding in cooling incoming air.

The backup system ensures a continuous supply with liquid nitrogen storage, ambient vaporizers, and pressure-regulating valves. It activates automatically during pressure drops or startups, delivering ultra-high purity (UHP) nitrogen seamlessly. The backup system includes two 15,000-gallon vertical liquid nitrogen (LIN) storage tanks (Chart), four ambient vaporizers for backup and one for startup (Cryoquip, SG770HF), and a 15,000-gallon startup LIN tank. The plant is equipped with Bradley ControlLogix PLC controls integrated with Rockwell FactoryTalk HMI software.

For more information contact David Emen, Business Development
david@phxequip.com
+1 732.709.7155 (Direct Dial)

To discuss plants you are selling Jesse Spector
plants@phxequip.com
+1 732.709.7157 (Direct Dial)
+1 908.902.8854 (Mobile)