HATCO

Air Compression & Separation

ON-SITE NITROGEN GENERATION SYSTEM

PSA Technology

Energy Efficiet
N_2 Gas Generator

Characteristics:

- Inert, clean, dry, non-flammable gas
- Has a true -40° to -56.6°C dew point
- presents a particular danger of asphyxiation
- Does not support the corrosion reaction
- Prevents oxidation of non-metallic components

Liquid Bulk Defacts:

- Liquid N2 boils at -196 degrees Celsius
- 2% of your tank volume can be lost due to evaporation every 24 hours
- No precise Liquid N2 volume readings from delivery truck when delivered
- Inconvenient, unsafe and unreliable
- Locked into a gas contract and continuous payment of increasing bills

USES FOR NITROGEN

In the early years of air separation, Oxygen has been the most widely used component in the steel industry. This situation began to change when nitrogen was no longer considered as a waste product and its inert properties could be exploited as a blanketing gas. Today, nitrogen is used in a most of applications, including:

- Blanketing of tanks with flammable or toxic materials
- Blanketing of metal reduction processes
- Purging process equipment
- Medical applications
- Soil freezing prior to excavation
- Food industries
- Finishing of rubber goods
- Cooling in helium or hydrogen plants
- Freeze grinding
- Fragmentation of scrap metal
- Electronics Industry

Purging and blanketing are probably the most popular usage of nitrogen gas. Tanks filled with hydrocarbon liquids have vapor space in the top of the tank, which collects hydrocarbon vapors. In atmospheric tanks, air can be drawn in when emptying the tank and it would be easy to ignite this by static electricity or friction. Purging the vapor space with nitrogen prevents this.

The Right Solution for the Whole Range of Applications

HATCO CT Series Nitrogen Generators

Reliability / Experience

The key to making the investment in Nitrogen Generation Equipment is purchasing from a dependable company.
HATCO's continuing in-house R&D has resulted in nitrogen generators that offer the best combination of economy and efficiency available today. With decades of experience in developing innovative products, HATCO has set the standard for precision engineering, optimum performance, and customer satisfaction.
As nitrogen flow and purity requirements increase, quite often, the more cost effective on-site generation technology is pressure swing adsorption systems.
HATCO PSAs are the industry standard for high performance and longevity, ensuring years of stability, trouble-free performance with the lowest energy costs.

Engineered PSA system

HATCO supplies customized engineered systems to accommodate hazardous environment installations, extreme weather conditions, redundancy considerations and unique application requirements.
HATCO engineering and manufacturing staff has addressed and solved many challenging project requirements with the development of highly custom engineered systems.
Let our dedicated, knowledgeable staff review your unique project requirements and offer an engineered generator designed and built to your required specifications.

Cost Savings:

You can save up to 300% of Nitrogen costs by generator your own nitrogen on-site.
The ideal solution lies in a range of proven gas generation solutions from HATCO, which enable users to produce their total demand of nitrogen gas on their premises, under their complete control.
As a result, companies can generate as much or as little nitrogen as needed at the required purity and at a fraction of the cost of having gas delivered by an external supplier.

By generating your own nitrogen on site, you can dramatically reduce your nitrogen supply costs and save on:

- Delivery Costs
- Bulk Liquid Evaporation Losses
- Monthly Cylinder / Tank Rental Fees
- Handling and Purchasing Costs
- Site Liability Insurance

System Types:

HATCO supplies two types of PSA Generators:

- Twin Tower Nitrogen Generators
- Sequential Nitrogen Generators

Process Description:

The HATCO nitrogen generators extract the available nitrogen in the ambient air from the other gases by applying the Pressure Swing Adsorption (PSA) technology via Twin Tower Adsorption method. The adsorption separation is accomplished in the following process steps:

1. Feed Air Compression and Conditioning

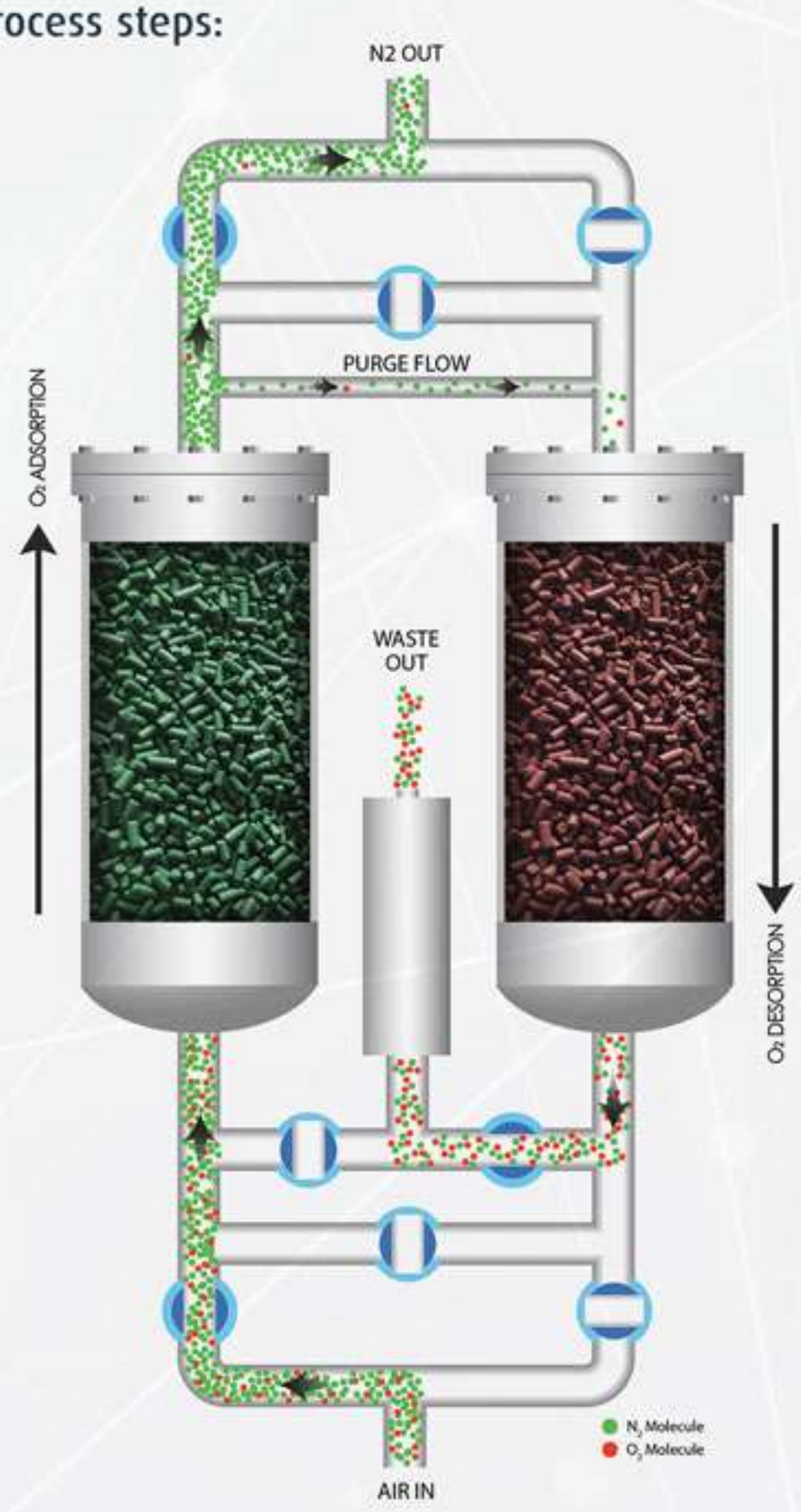
The ambient (inlet) air is compressed by an air compressor, subsequently dried by an air dryer and filtered before entering the process vessels.

2. Pressurization and Adsorption

The pre-treated air is passes into a vessel filled with Carbon Molecular Sieve (CMS) where the oxygen is adsorbed preferentially in the CMS pores so that nitrogen with an adjustable purity (down to a residual O2 content of 50 ppm) remains in the gas stream. Before the adsorption capacity of the CMS is fully utilized, the nitrogen separation process is interrupted and the switching of the adsorber vessels is initiated.

3. Desorption

The saturated CMS is regenerated (i.e. the adsorbed gases are released) by means of pressure reduction below that of the adsorption step. This is achieved by a simple pressure swing system. The resultant waste stream is vented into atmosphere through a silencer/muffler. The regenerated adsorbent can now be used again for the generation of nitrogen.



4.Nitrogen Product

Adsorption and desorption take place alternately at equal time intervals. This means that the continuous generation of nitrogen can be achieved with two adsorbers, one being switched at adsorption and the other at regeneration. The result is a constant stream of on-site produced high purity nitrogen at cost significantly below that of liquid or bottled gases.

Nitrogen Sequential PSA Series

A dedicated solution for Large Capacities and Consumptions

The Nitrogen Sequential PSA process consists of multiple individual Twin Tower Adsorber Vessels operating on alternating cycles. By utilizing this sequential operation of the individual PSAs, the requirement of large buffer tanks is eliminated from the process.

System Benefits:

- Generate your own Nitrogen on demand
- Reduce your Nitrogen costs by up to 90%
- Purity Certification included with each system
- Systems' life expectancy of over 20 years
- No missed deliveries, escalating costs, or contracts to sign
- Fully automatic: production begins when demand downstream is sensed

Key Features:

- Purities up to 99.99%
- Available in Largest Capacities
- Fully automated unattended operation
- Automatic part load operation to 30% of design capacity
- Pressure Switch for automated Idle-Mode
- Special design due to Channeling
- skid mounted and easy installation at site

Standard Equipment:

- Adsorber Vessels are Carbon Steel
- Long life Pneumatic and Solenoid Valves
- Internal C.S. Piping in specified coatings
- Exhaust Muffler
- Oxygen Analyzer
- Hour Meter
- Product Pressure Transmitters
- Product Flow Indication
- Pressure Indicators
- Nitrogen and Air flow Regulation
- Air Control Pressure Regulator
- Air Control Piping & Instrumentation
- Safety Valves
- Control System with SIEMENS PLC

Exclusive Features:
Intelligent PLC

- On line purity indication
- User friendly 4.3" TFT Touch screen
- Animated real time process display
- Auto cut-in & cut-off based on demand
- RS 485 MODBUS interface for remote monitoring
- Inbuilt Data logger stores minimum 50 alarms/trips
- PSA cycle trip for Low Air Inlet Pressure
- Alarm for High Oxygen Content
- Hour meter supports preventive maintenance
- Announcement for filter cartridge replacement

Options:

- Feed Air Compressor
- Instrument Air Dryer
- Air Receiver
- Air Filters
- Activated Carbon Tower
- Air Buffer
- Nitrogen Buffer
- Set of External Product Filters
- Product Booster Compressor
- Bottle Filling Station
- Classified or Unclassified Areas
- Containerized and Mobilization

Five Key Features to Guarantee Nitrogen Quality

1-Pre-treatment Package

Good Quality Compressed Air = Good Quality Nitrogen

All PSA nitrogen generators must have the correct air inlet quality to ensure stable operation and a long service life. Although refrigerant dried air is acceptable for lower purity applications, we believe that protecting your investment and ensuring trouble-free operation is important.

Stored nitrogen is often specified as dryer than 2 ppm equivalent to a dew point of -70°C. The gas source for drying should always be validated before use. As a rule of thumb the gas must be at least 10°C lower than required purge dryness.

Quite simply, in HATCO's long experience of manufacturing and installing PSA nitrogen generators, a desiccant dryer will provide better protection to the CMS, typically extending the service life to 10 years and beyond.

This means that HATCO N2 generators can operate from virtually any compressed air supply.

In addition, the pre-treatment package can be controlled by the nitrogen generators, so that when it enters economy stand-by mode, the dryer also switches into economy stand-by mode. This consumes zero compressed air to save energy and significantly reduces running costs.

2- Specially selected CMS materials provide:

- Optimum gas productivity and regeneration to ensure consistent purity
- High crush strength to prevent attrition and breakdown of the CMS
- Low air to nitrogen ratios to reduce air consumption
- Wide purity range for customer flexibility

3- Process Mass Flow Solution

In large capacity projects, mass control of process flow is a gold key. The HATCO's valuable knowledge and experience is the one what guarantees the goal.

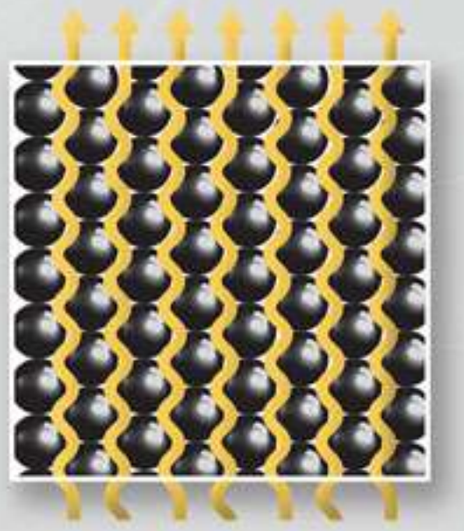
This prevents bed movement during operation to eliminate attrition, breakdown and leakage paths which could lead to premature failure or loss of nitrogen purity.

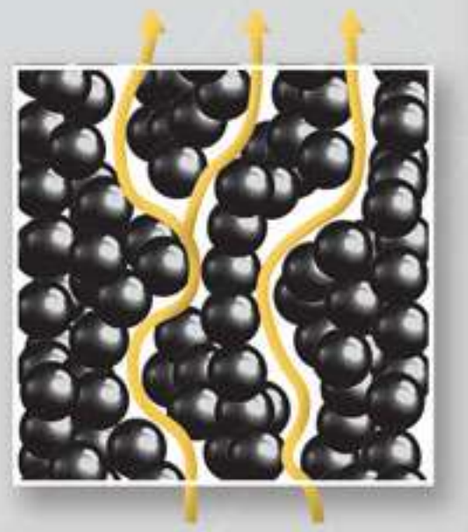
4- 'Snow storm' filling ensures consistent nitrogen purity

HATCO PSA nitrogen generators utilize a technique known as 'snow storm filling' to charge the adsorption columns with CMS.

Benefits:

- Achieves maximum packing density for the CMS material, fully utilizing all of the available space envelope.
- Less CMS required and prevents compressed air channeling through the CMS as experienced with most conventional designs. Due to channeling, conventional designs require more CMS to achieve an identical purity, increasing physical size, operational and maintenance costs.
- Prevents CMS attrition which can lead to dusting, blocked filters, silencers and catastrophic loss of nitrogen purity.
- Allows 100% of the available CMS material to be used for producing nitrogen, therefore reducing the amount of CMS required and overall lifetime costs.
- 100% of CMS is regenerated ensuring a very stable and consistent nitrogen purity.
- Provides a low, equal resistance to flow, allowing multiple CMS chambers and multiple generator banks to be used.





5- Control System

The CT Series of nitrogen gas generators have a comprehensive integral control system fitted as standard with the following benefits:

- Integral Oxygen Analyzer: This ensures that the nitrogen purity is constantly maintained and gives an instant visual confirmation of the output gas quality. 4 ~ 20mA outputs facilitate remote monitoring if required and the possibility to data log for complete traceability.
- Mass flow controller: The mass flow controller stops the generator being overflowed and ensures the required purity and pressure are maintained regardless of downstream conditions. Consistently overflowing a nitrogen generator can cause irreversible damage to the CMS and affect its ability to recover gas purity.
- Outlet pressure regulator: Controls nitrogen pressure to match system requirements and ensures that your process is protected against overpressure.
- Economy Control: During periods of 'no nitrogen' usage, the generator senses this and enters economy stand-by mode. As soon as nitrogen use is resumed again, the generator reverts to operational mode.

During economy stand-by, zero compressed air is consumed by the generator and the associated pre-treatment package. This results in reduced energy consumption and significant operating cost reductions. Special requirements on PLC is available upon the request.

Mobile Systems:

HATCO Containerized Nitrogen Generator System is mainly for portable and moving purposes, specially used in oil field, airport, refining, chemical processing and other applications, where nitrogen source is far away from consumers. It can be integrated in Nitrogen Generator and compressed air system too.

Key Features

- Easy transportation, installation
- Designed for extreme ambient conditions
- Automatic operation, DCS communication available
- Customize the system to meet the customer's special requirements

Plant Technical Data

Nitrogen capacity	1 to 1500 m^3/h (by one train)
Maximum Nitrogen Outlet Pressure	11 bar g
Nitrogen purity	up to 99.99 vol.%

Process Air Inlet Temperature Range	10 ~ 50°C
Air Inlet Pressure Range	7 ~ 12 bar g
Ambient Temperature	5 ~ 50°C
Humidity	Up to 100%
Air Inlet Quality	ISO 8573-1; 2010 Class 1.4.1 Dust: 0.01 micron Dew point: +3°C Oil: 0.003 mg/m^3

Plant Performance data is normally based on 7 bar g (100 psi g) air inlet pressure and 20°C ~ 30°C air inlet temperature.
Nm3 reference standard = 0°C, 1013 mbar (a), 0% relative water vapor pressure.
Consult HATCO for performance under other specific conditions.

The CT nitrogen generators are supplied as a package containing the inlet air piping and nitrogen outlet connections, controls and valves.

Services:

Our Commitment:

Our mission is simple; to flourish by helping our customers to achieve their business goals.
HATCO has been building custom air compression and separation plants for many years. We take pride in our work and make every effort to meet and exceed the customers' expectations. In global vision and as a domestic market's leader, our aim is to impress with the quality and professionalism of own duty. We are here to make complexity become simplicity.

Project Services:

HATCO provides various kinds of services from technical assistance to site after sales services to satisfy customer's needs. We have dedicated engineers and technicians with extensive experience and expertise for each service.

After Sale Services;

- Site Acceptance Test
- Punch Clear services
- Commissioning services
- Spare Parts
- Warranty Claim
- Customer Training

HATCO is "Where Complexity Becomes Simplicity."

HATCO
Compression & Separation
Building 114, Kajabadi St,
Africa Ave, Tehran, Iran
Postal Code:19669913175
Tel: +98 21 28 11 10 19
Fax:+98 21 22 66 41 16
info@hatco.ir
www.hatco.ir