



*Highest Efficiency
Membranes on
the Market*

GENERON® OIL & GAS APPLICATIONS

*Over 1,000
Systems Sold*

*Product
Blanketing
& Transport*

*General Rig
Purging*

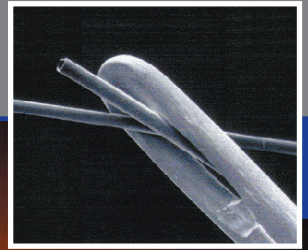
BOP

*Drilling
Support*

***From Concept To Completion,
We Provide Solutions!***



Generon® Membrane Technology



TECHNOLOGY

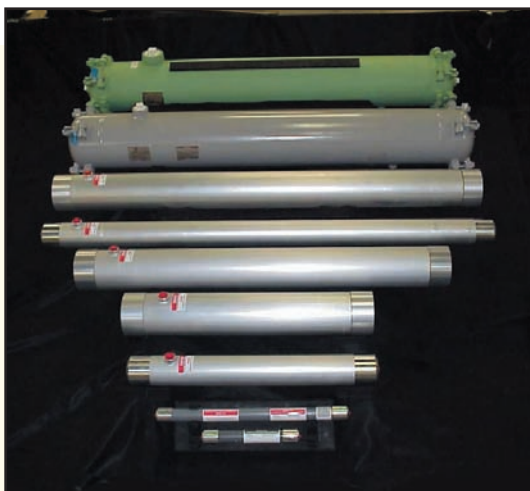
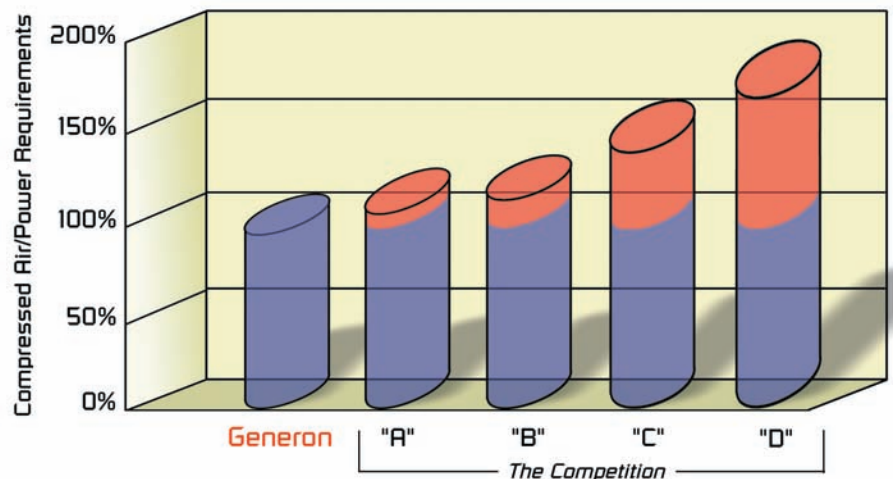
- Highest efficiency membranes on the market
- Long term commitment to R&D at our California module fabrication and research center
- Generon® has over 41 patents for its innovative polymer design
- Systems are designed by our experienced engineering team and assembled in our Houston manufacturing facility
- Generon® maintains a staff of engineers with extensive experience in system design and compression packaging to meet your individual needs



PERFORMANCE

- Significant savings over bulk liquid or bottled Nitrogen
- Utilizes 12-90% less feed air than competitive systems
- Product durability assured through extensive product testing
 - Every membrane design must pass a 10,000 cycle pressure/temperature durability test simulating 10 years of operation
- Quality Manufacturing Operations
ISO 9001:2000 Certified

Power/Air Consumption Per Unit Of N2 Produced
(Product comparisons at 99% purity)



- ▲ Nitrogen purities to 99.9%
- ▲ Product Dew Point to -84°F (-64°C)
- ▲ Extensive product range for the smallest module producing 25 scfh (.7 Nm³/h) to large integrated system producing 187,000 scfh (4,915 Nm³/h)
- ▲ Product pressures available in two standards
200 psig / 14 barg and 330 psig / 23 barg
- ▲ System designed to 10,000 psig / 689 barg with post compression

Generon® Oil & Gas Applications

Nitrogen is used extensively for the drilling, completion and workover of oil and gas wells. It is also used for pressure maintenance and gas storage in condensate formations. Even the gas gathering and pipeline systems benefit from the inerting properties of Nitrogen – both onshore and offshore. Nitrogen can be generated on-site at high pressure and low Oxygen levels to safely prevent ignition of flammable gases and to protect oil field tubulars from downhole corrosion.

DRILLING SUPPORT

- Instrument panel inerting
- Dry air supply for engine starters, controls, dry bulk transfer, and hoisting systems
- Flare gas inerting
- BOP closure device/heave compensators
- Pressure systems purging and testing



WORKOVER & COMPLETION

- Displacement of well fluids to initiate flow
- Nitrogen supply for Well Stimulation
- Dry air supply for engine starters, air controls, dry bulk transfer and hoisting systems
- Tubular and well head testing
- Flare gas inerting

OIL & GAS PRODUCTION

- Injection and pressure testing
- Enhanced oil recovery, reservoir pressure maintenance
- Gas Lifting using Nitrogen as a supply gas
- Plunger lifting
- Displacement of well fluids to initiate flow
- Coal bed methane well bore cleaning

OIL & GAS TRANSPORTATION

- Pigging and purging pipelines
- Inerting storage facilities
- Blanketing storage tanks

PLUG & ABANDONMENT

- Casing and tubular cutting
- Pressure testing
- Tubular inerting





Generon® Oil & Gas Applications



BOP CLOSURE DEVICE/HEAVE COMPENSATORS

The BOP closure response time can be greatly enhanced when incorporating a Nitrogen charged accumulator system. Nitrogen not only provides a stable pressure for the BOP and heave compensators systems, it also provides internal corrosion control for the walls and seals.

AIR OPERATED EQUIPMENT

Nitrogen provides a dry air supply for engine starters, dry bulk transfer, and hoisting systems. The use of dry air can extend the life of these systems for years and prevents many costly break downs.

INSTRUMENT PANELS

Nitrogen provides a dry inert corrosion free atmosphere for the instrument panels prolonging the life of the systems and preventing many costly shut-downs.

INERTING TUBULARS

When transporting drilling/production tubing or coiled tubing from the rig/platform to the shore base, it may be necessary to inert the tubing before shipment. Generon® can provide an on-site gas separation system to meet that requirement.

WELL COMPLETION OPERATIONS

For well completion operations, Nitrogen is used in cementing operations, pressure-testing equipment, setting packers and other pressure-activated devices, as well as controlling cement slurry weights. Nitrogen can be used in detonating charges for perforations. The low density, high pressure Nitrogen is also ideal for well cleaning and fluid displacements.

WELL WORKOVER OPERATIONS

New or existing wells that suffer from poor production rates can often be revitalized by fracturing the formation to increase effective formation volume or introducing stimulation fluids and acids to improve oil permeability. High pressure Nitrogen can displace drilling fluids, reduce hydrostatic heads, and allow the well to commence production.



ENHANCED OIL RECOVERY AND PRESSURE MAINTENANCE

Nitrogen is used to maintain the reservoir pressure of formations that have suffered diminished productivity over time from natural pressure depletion. The oil production of wells with limited gas reserves can be enhanced with reservoir pressure supplied by Nitrogen injection.

NITROGEN FLOODS

Since Nitrogen is essentially immiscible with oil and water, a Nitrogen injection program or flood can drive unrecovered hydrocarbons from an injector well to a producing well for subsequent production.

GAS LIFTING

The production of wells experiencing pressure depletion can be enhanced if the hydrostatic head can be lightened by introducing Nitrogen as a gas lift mechanism in the annulus of the well or in parasitic strings. The hydrostatic pressure is reduced, promoting greater oil and gas production.

COAL BED METHANE RECOVERY

After performing fracturing treatments on the methane bearing coal seams, many times the well tubulars are either plugged with fracturing material or the hydrostatic weight of the fluids are preventing the well from flowing. Generon® can provide a Nitrogen source for removal of the fracturing materials or fluids at a much lower cost than those presently used.

OIL AND GAS TRANSPORTATION

Generon® offers rental, lease or purchase of portable Nitrogen Production Units (NPU) for pigging and purging of pipelines. These same units can be used for Nitrogen inerting and blanketing of ship/barge or train/truck mounted storage facilities.



Custom-Designed Systems To Your Exact Specifications

RIG INSTRUMENTATION & MAINTENANCE PURGING CABINET SERIES SPECIFICATIONS @ 100 PSIG INPUT

Model Designation	2000	4000	6000
N ₂ Output @ 95% N ₂ + Inerts	.4 scfm / .01 Nm ³ /m 1.5 scfm / .04 Nm ³ /m	4.3 scfm / .11 Nm ³ /m 8.5 scfm / .22 Nm ³ /m	15.6 scfm / .41 Nm ³ /m 184 scfm / 4.83 Nm ³ /m
Maximum Working Pressure	200 psig / 14 barg	200 psig / 14 barg	200 psig / 14 barg
N ₂ Dew Point (Atm)	< -84°F / < -64°C		
Dimensions (LxWxH) ft/m	3' x 2' x 1' / .9 x .6 x .3	4' x 2' x 1' / 1.2 x .6 x .3	2'9" x 2'9" x 7'6" / .8 x .8 x 2.3
Weight (lbs/kg)	100-115 lbs / 45-52 kg	220-240 lbs / 100-109 kg	450-650 lbs / 205-295 kg
Operating Temperature Range	-40°F / 131°F (-40°C / 55°C)		
Electrical Power	480V / 3Ph/60Hz Standard, customer to specify alternate power supply		
Control System	Manual	Manual	Manual
Heater	Standard	Standard	Standard
Oxygen Analyzer	Standard	Standard	Standard
Feed Air Flow Requirement	.77 scfm / .02 Nm ³ /m 3.05 scfm / .08 Nm ³ /m	8.9 scfm / .23 Nm ³ /m 17.9 scfm / .47 Nm ³ /m	31.3 scfm / .82 Nm ³ /m 343 scfm / 8.99 Nm ³ /m
Horsepower Requirements	3 HP (2.2 kW)	4 HP (3 kW) - 7.5 HP (5.6 kW)	15 HP (11.2 kW) - 150 HP (112 kW)

SKIDDED SERIES SPECIFICATIONS @ 175 PSIG INPUT

Model Designation	6200	6500	7200
N ₂ Output @ 95% N ₂ + Inerts	160 scfm / 4.2 Nm ³ /m 767 scfm / 20.16 Nm ³ /m	200 scfm / 5.25 Nm ³ /m 958 scfm / 25.18 Nm ³ /m	97 scfm / 2.56 Nm ³ /m 1,947 scfm / 51.18 Nm ³ /m
Maximum Working Pressure	200 psig / 14 barg	200 psig / 14 barg	200 psig / 14 barg
N ₂ Dew Point (Atm)	< -84°F / < -64°C		
Dimensions (LxWxH) ft/m	9' x 4' x 7'3" / 2.74 x 1.2 x 2.2 9' x 7' x 7'3" / 2.74 x 2.1 x 2.2	9' x 4' x 7'3" / 2.74 x 1.2 x 2.2 9' x 7' x 7'3" / 2.74 x 2.1 x 2.2	9' x 4'9" x 7'8" / 2.74 x 1.5 x 2.4 9' x 7'6" x 7'8" / 2.74 x 2.3 x 2.4
Weight (lbs/kg)	1,500-3,800 lbs / 680-1,724 kg	1,500-3,800 lbs / 680-1,724 kg	1,800-25,000 lbs / 816-11,340 kg
Operating Temperature Range	-40°F / 131°F (-40°C / 55°C)		
Electrical Power	480V-220V / 3Ph/60Hz Standard, customer to specify alternate power supply		
Control System	Manual/Automatic (PLC)	Manual/Automatic (PLC)	Manual/Automatic (PLC)
Heater	Standard	Standard	Standard
Oxygen Analyzer	Standard	Standard	Standard
Heavy Duty Base Skid	Standard	Standard	Standard
Remote Telemetry	Optional	Optional	Optional
Area Classification	Non-Hazardous Standard	Non-Hazardous Standard	Non-Hazardous Standard
Feed Air Flow Requirement	303 scfm / 7.96 Nm ³ /m 1,454 scfm / 38.22 Nm ³ /m	372 scfm / 9.78 Nm ³ /m 1,783 scfm / 46.87 Nm ³ /m	185 scfm / 4.86 Nm ³ /m 3,692 scfm / 97.06 Nm ³ /m
Horsepower Requirements	125 HP (93.2 kW) 605 HP (451.2 kW)	150 HP (111.9 kW) 670 HP (499.6 kW)	100 HP (74.6 kW) 1,600 HP (1193.2 kW)



IGS Generon® References, Standards and Track Record

Sampling of Customer Reference List

- ▲ ADM
- ▲ Aker Kvaerner
- ▲ Allied Signal
- ▲ AMEC
- ▲ Amerada Hess
- ▲ Aramco
- ▲ BASF
- ▲ Bayer
- ▲ Bechtel
- ▲ Bilnam
- ▲ BJ Services
- ▲ BOC
- ▲ BP
- ▲ Burk Royalty
- ▲ Celanese
- ▲ Chevron/Texaco
- ▲ Chiquita
- ▲ Conoco/Phillips
- ▲ Daewoo
- ▲ Dome Petroleum
- ▲ Dow Chemical
- ▲ Global Santa Fe
- ▲ Halliburton
- ▲ Hamworthy
- ▲ Hibernia
- ▲ Hoek Loos
- ▲ Hutchinson
- ▲ KBR
- ▲ Linde
- ▲ Lubrizol
- ▲ Mitsubishi Heavy Industries
- ▲ Modec
- ▲ Nestle
- ▲ Odra Gas
- ▲ Oilvest
- ▲ Pemex
- ▲ Rexroth
- ▲ Sener Petrol
- ▲ Sinopec
- ▲ Statoil
- ▲ Shell
- ▲ Transocean
- ▲ Unitor
- ▲ Weatherford

Industry Standards

- ▲ ASME
- ▲ CE/PED
- ▲ ATEX/CENELEC
- ▲ DNV
- ▲ Lloyds Register
- ▲ CSA
- ▲ Bureau Veritas
- ▲ ABS
- ▲ Baseefa
- ▲ IEC/NEC
- ▲ NFPA RINA
- ▲ Class I Div 2
- ▲ Zone 2
- ▲ GOST
- ▲ Class NK
- ▲ Germanischer Lloyd
- ▲ NEMA/IP
- ▲ Customer Specifications

System History

- ▲ Over 22,000 Nitrogen/Dehydration Membranes Sold To Date
Including:
 - 100+ NPU Systems
 - 500+ Engineered Systems
 - 189+ Cabinet Systems



IGS INNOVATIVE GAS SYSTEMS

- ❑ Innovative Gas Systems is a global technology company with operational centers in North America, South America, Europe and Asia.
- ❑ Our products are world class with over 75 patents supporting our innovative technology in Nitrogen/Dehydration membranes, Nitrogen PSA and Oxygen PSA/VPSA.
- ❑ Please visit our website for a review of the complete list of products from IGS or contact one of our local sales associates directly.



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