


# CELLGAS

by  SIEBC group

## WELL STIMULATION USING NITROGEN INJECTION



# INTRODUCTION TO NITROGEN INJECTION TECHNOLOGY



**Nitrogen injection** is a proven and efficient method for **well stimulation** and production enhancement in the oil and gas industry. By introducing nitrogen gas into the wellbore, the hydrostatic pressure of the fluid column is reduced, allowing hydrocarbons trapped in the reservoir to **flow more easily** to the surface.

Physically, **nitrogen reduces the density and viscosity** of the well fluids and helps displace liquid phases such as water, heavy crude, or emulsions. Chemically, nitrogen is **inert and non-reactive** with hydrocarbons or reservoir rock, preventing corrosion and undesired reactions that could alter formation properties.

This process also helps clean up wells with liquid loading, enables safe pressure control during maintenance, and prevents oxidation by displacing oxygen in pipelines and process equipment.

## Why Nitrogen?

- Inert and non-corrosive gas
- Non-flammable, ensuring operational safety
- Easily generated on site via membrane or PSA systems
- Low cost and minimal logistical requirements
- Environmentally friendly and versatile for multiple applications





## TYPICAL OILFIELD APPLICATIONS

- Stimulation of wells in low-permeability reservoirs
- Temporary gas lift to assist production
- Well cleanup in cases of high liquid accumulation
- Inerting pipelines and equipment before maintenance
- Pressure control during hydraulic fracturing operations

## BOOST WELL PERFORMANCE INJECT EFFICIENCY WITH NITROGEN



SAFETY



EFFICIENCY



PRESSURE

## BENEFITS FOR YOUR OPERATIONS

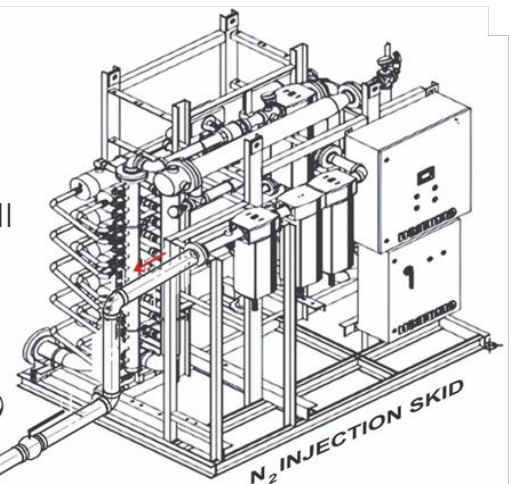
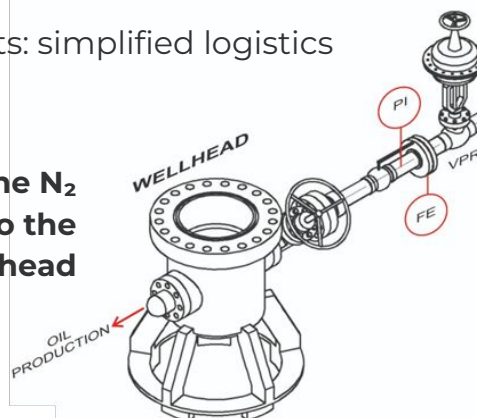
- Immediate boost in hydrocarbon production
- Reduced well intervention time
- Improved secondary recovery efficiency
- Lower environmental risks
- Cost-effective solution for mature or marginal fields



## OPERATIONAL ADVANTAGES

- On-site nitrogen generator: no need for cryogenic supply or delivery
- High availability: suitable for remote sites or areas lacking infrastructure
- Compact, modular design: easy to transport and install
- Continuous and safe operation: no risk from stored pressurized gas
- Reduced operating costs: simplified logistics and lower maintenance

**Connection of the N<sub>2</sub> injection line to the wellhead**



# MEMBRANE TECHNOLOGY



## Operating Principle

Membrane nitrogen generation is based on the selective permeability of gas molecules through hollow polymer fibers. Compressed, clean, and dry air enters the membrane module, where oxygen, moisture, and trace gases permeate through the fiber walls faster than nitrogen. The remaining gas stream, rich in nitrogen, exits the module as the final product.

## Advantages

- Robust and simple design with no moving parts
- Fast start-up and continuous nitrogen production
- Adjustable purity ideal for most oilfield applications
- Compact, modular, and containerized systems for field deployment
- Low maintenance and long service life

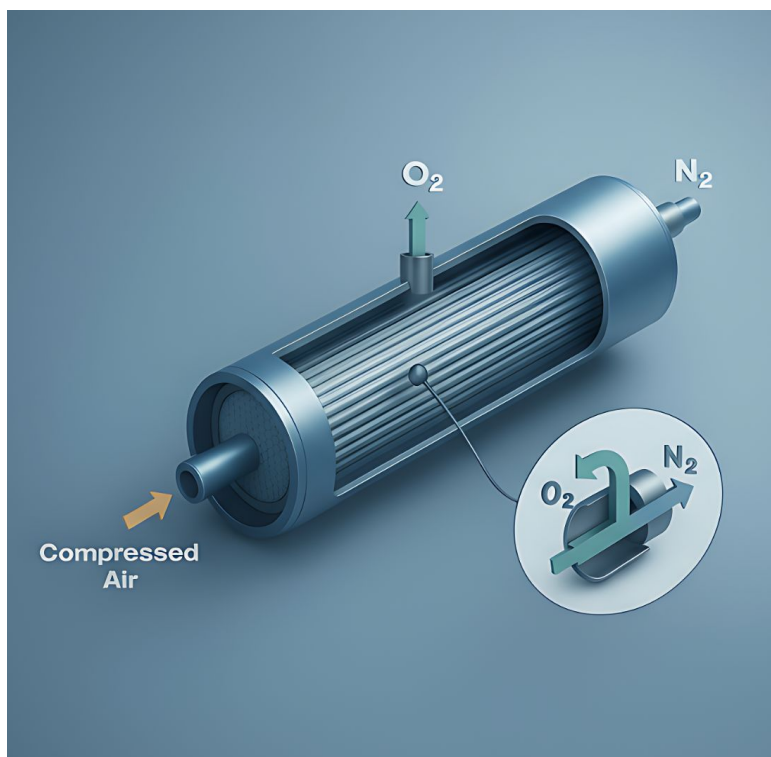


## Typical Applications

- Well stimulation and cleanup
- Temporary gas lift and inertization
- Pressure control in hydraulic fracturing
- Purging of pipelines and process systems

## Limitations

For processes demanding very high nitrogen purity (above 95–97%), membrane systems may become less efficient. In such cases, PSA systems are the preferred option.



## Technical data

CELLGAS N2 Membrane				
Purity 95% - 99.5%				
Product MODEL	N2 capacity (Nm <sup>3</sup> /h)	Air req. (Nm <sup>3</sup> /min)	Inlet DN	Outlet DN
80216005	50	2,1	32	25
80216007	70	2,9	32	25
80216010	100	4,2	40	25
80216015	150	6,4	50	32
80216020	200	8,5	50	40
80216040	400	17	65	50
80216050	500	20	80	50
80216060	600	25	80	50
80216080	800	33	100	65
80216100	1000	41	100	65
80216120	1200	49	100	80
80216150	1500	61	125	80
80216200	2000	82	150	100

## Technical Indicators

- Nitrogen Flow Rate: 1~5000 Nm<sup>3</sup>/h
- Nitrogen purity: 95%~99.5%  
(Non-oxygen content)
- Nitrogen pressure: 0.1~1.6 MPa (adjustable)
- Nitrogen dew point: 0~-60 °C



# PSA (PRESSURE SWING ADSORPTION) TECHNOLOGY



## Operating Principle

PSA technology relies on twin adsorption vessels filled with carbon molecular sieves (CMS). As compressed air passes through, oxygen and trace gases are selectively adsorbed while nitrogen passes through as the product gas. The system alternates between adsorption and regeneration cycles to ensure a continuous supply.

## Advantages

- Nitrogen purity up to 99.999%
- High stability and pressure for sensitive applications
- Energy-efficient with automatic cycle control
- Containerized modular systems for easy installation
- Designed for continuous, heavy-duty industrial use

## Applications

- Enhanced oil recovery (EOR)
- Reservoir pressurization
- Chemical and petrochemical industries
- Environments requiring ultra-high purity



# PSA (PRESSURE SWING ADSORPTION) TECHNOLOGY



## Technical data

CELLGAS N2 PSA																
		Purity 97%			Purity 99%			Purity 99.9%			Purity 99.99%			Purity 99.999%		
Product MODEL	N2 capacity (Nm <sup>3</sup> /h)	Air req. (Nm <sup>3</sup> /min)	Inlet DN	Outlet DN	Air req. (Nm <sup>3</sup> /min)	Inlet DN	Outlet DN	Air req. (Nm <sup>3</sup> /min)	Inlet DN	Outlet DN	Air req. (Nm <sup>3</sup> /min)	Inlet DN	Outlet DN	Air req. (Nm <sup>3</sup> /min)	Inlet DN	Outlet DN
80316000	5	0,2	16	12	0,2	16	12	0,3	15	15	0,4	15	15	0,5	25	15
80316001	10	0,4	15	15	0,4	15	15	0,6	15	15	0,8	15	15	1	25	15
80316002	20	0,7	15	15	0,8	15	15	1,2	25	15	1,6	25	15	1,9	25	15
80316003	30	1,1	25	15	1,2	25	20	—	—	—	—	—	—	2,9	40	25
80316004	40	1,5	25	20	1,6	25	20	2,3	25	20	3,2	32	25	3,9	40	25
80316005	50	1,8	25	20	2	25	25	—	—	—	—	—	—	—	—	—
80316006	60	2,2	25	25	2,4	25	25	3,5	32	25	—	—	—	5,8	40	32
80316008	80	2,9	32	25	3,2	32	25	4,7	32	25	6,4	40	32	7,7	50	32
80316010	100	3,7	32	25	4	32	25	5,8	40	32	8	40	32	9,7	50	40
80316015	150	5,5	32	25	6	32	25	—	—	—	—	—	—	—	—	—
80316020	200	7,3	40	32	8	40	32	11,7	50	32	16	65	50	19,3	80	50
80316030	300	11	40	32	12	40	32	17,5	50	40	24	80	65	29	100	65
80316040	400	14,7	50	40	16	50	40	23,3	65	40	32	100	65	—	—	—
80316060	600	22	65	50	24	65	50	35	65	50	48	125	80	—	—	—
80316080	800	29,3	80	65	32	80	65	46,7	80	65	64	150	100	—	—	—
80316100	1000	36,7	80	65	40	80	65	58,3	125	80	80	200	125	—	—	—
80316150	1500	55	125	80	60	125	80	87,5	150	100	—	—	—	—	—	—
80316200	2000	73,3	150	100	80	150	100	—	—	—	—	—	—	—	—	—
80316300	3000	110	200	100	120	200	100	—	—	—	—	—	—	—	—	—

## Technical Indicators

- Nitrogen Flow Rate:1~5000 Nm/h
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# TECHNICAL FEATURES

## Available Equipment

Typical portable skid for nitrogen injection — **modular assembly**, easily transported by 4x4 truck, light vehicle, or trailer. Designed for reliable, continuous operation in oilfield and industrial environments.

## Pressure and Flow Capacities

- Customizable to meet project requirements - nitrogen boosters available.
- Systems are built to handle a **wide range of pressures and flow rates** while maintaining stable nitrogen purity.

## Stable and Reliable

- Proven and advanced technology, validated in field operations
- High-quality components ensure long-term performance
- Multiple online monitoring and protection systems
- Capable of operating efficiently under various loads and environmental conditions

## Intelligent Control

- Smart PLC control system
- Optional intelligent monitoring supporting remote communication
- One-click start/stop operation
- Automatic standby mode when nitrogen demand is low

## TECHNICAL FEATURES

### Rich Configurations

- Monitoring of oxygen content, dew point, flow rate, and pressure (standard or optional)
- Continuous online monitoring and automatic adjustment of nitrogen purity

### Leading in Energy Efficiency

- Nitrogen purity can be set and adjusted according to operational needs
- Optimized control ensures minimum energy consumption per cubic meter produced

### Purity Guaranteed

- Continuous online monitoring and automatic regulation
- Off-spec nitrogen is automatically vented to maintain product quality

### Monitoring and Control Systems

- Smart PLC control system
- Optional intelligent monitoring supporting remote communication
- One-click start/stop operation
- Automatic standby mode when nitrogen demand is low



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