



Weatherford®

Pipeline & Specialty Services

On-Site Generated Nitrogen Systems

Suitable for All Your N₂ Applications

Weatherford provides the industry with the largest fleet of portable on-site Nitrogen Production Units (NPU).

Our Nitrogen units can deliver pressures as high as 5,000 PSI (345 bar), with flow rates ranging from 300 scfm (8.5 m³/min) to more than 3,000 scfm (85 m³/min). System N₂ purities range from 92% to 99% at dewpoints of up to -90°F (-68°C). Some applications include:

- Mine fire suppression
- Purging and displacing unwanted products
- Drying
- Pressure testing
- Helium leak detection
- Foam inerting
- Preservation
- Gas lifting
- Enhanced oil recovery

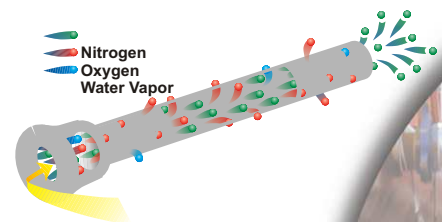
Offering the Best Technologies

The heart of the Nitrogen Production Unit (NPU) is the membrane fiber. To begin the process of N₂ production, the NPU receives compressed air—at least 175 PSI (12 bar)—then separates the oxygen from the compressed air. The air separation process is performed using the membrane modules that are contained within the NPU. Each module is constructed of millions of hollow fibers approximately the diameter of a human hair.

Creating membrane nitrogen is achieved by pulling nitrogen from the air on site. It allows for the safe production of a continuous supply of nitrogen at generally a lower cost to the client, with no cryogenic hazard or logistical problems. Weatherford now has the largest fleet of on-site generated membrane nitrogen production units in the world. Membranes are a series of hollow fibers that have holes in the walls. Compressed air is forced through these hollow fibers. The holes in the wall are small enough that CO, CO₂ and O₂ will exit through them under pressure. These same holes, however, are too small to accept N₂ or Argon (Ar). By forcing air down the fiber, we permeate (force to escape) the smaller molecules and capture the Ar and N₂ at the other end. We generally heat the air in the membrane to excite the molecules in the hollow fiber and increase the chance that they will permeate out through the holes.

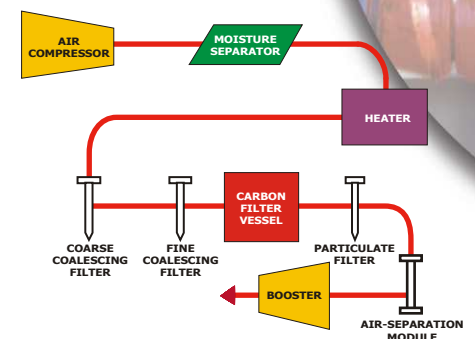
This service is ideal for remote locations or regions where cryogenic nitrogen is limited or disruptive in supply. In most scenarios, membrane applications will be the most economic solution, regardless of cryogenic availability, while minimizing risk to the client.

The New Generation Service CompanySM



Oxygen and water vapor are unwanted gases which quickly permeate the membrane, allowing nitrogen to flow through the fiber bores as the product stream.

Nitrogen System Layout



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