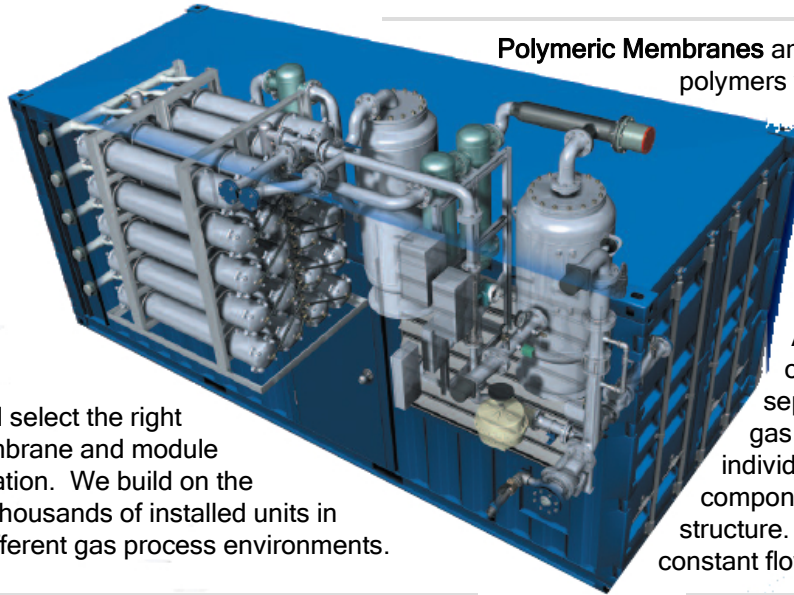


### Membrane Systems for Natural Gas Applications – CO<sub>2</sub> & H<sub>2</sub>O

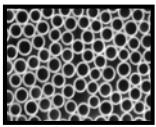
>> modularized, custom-designed polymer-based membrane systems with proven performance.

Gulf Gases will work with you to understand your unique application requirements, then design, build & deliver the right membrane configuration in a system that's correctly optimized for processing CO<sub>2</sub> and H<sub>2</sub>O removal from your wellhead or midstream natural gas production systems.



**Polymeric Membranes** are unique gas separation polymers with engineered characteristics of permeability, selectivity and diffusion resistance. The Polymeric Membranes used in these units have been designed to best fit natural gas CO<sub>2</sub> related process needs.

After a pre-treatment option for coalescents and particulates, the separation of CO<sub>2</sub> & H<sub>2</sub>O in gas feeds is performed by the individual permeation rate of each component through the membrane wall structure. Production is continuous at constant flow, pressure and purity.



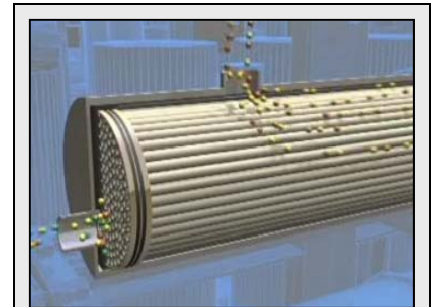
Gulf Gases will select the right polymeric membrane and module for your application. We build on the experience of thousands of installed units in hundreds of different gas process environments.

#### Applications:

- CO<sub>2</sub> removal at the wellhead to reduce transportation costs and improve midstream gas compositions,
- H<sub>2</sub>O dehydration at the wellhead,
- CO<sub>2</sub> removal at the midstream process plant as an alternative or to reduce capital size of more expensive amine plant,
- Dehydration at the midstream process plant,
- Amine plant process enhancement by adding CO<sub>2</sub> Membrane pre-treatment unit,
- Amine plant operating cost reduction through reduced CO<sub>2</sub> loading,
- First-step in Helium recovery applications.

#### Benefits:

- **Rapid Installation** - units arrive totally prefabricated, ready to connect and run,
- **Low Maintenance** - no moving parts, very little annual maintenance,
- **Long Life** - modules can run for many years before replacements are required,
- **Fully Automated** - no manpower required for operation,
- **High Reliability** - continuous, constant production and dependable product quality,
- **Monitor & Control** - automated monitoring and controls make any necessary adjustments automatically,
- **Low Cost** - very low capital, operating & maintenance costs.



Highly permeable molecules of CO<sub>2</sub> & H<sub>2</sub>O are quick to migrate, rapidly concentrating on the permeate side of the Membrane. CH<sub>4</sub>, C<sub>2</sub> and C<sub>3</sub> molecules stay in the retentate and exit as product with only a small pressure drop.

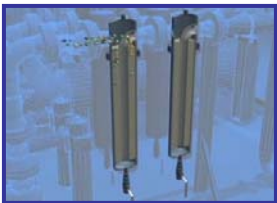


# Membrane Systems for Natural Gas Applications – CO<sub>2</sub> & H<sub>2</sub>O

## Process Flow:



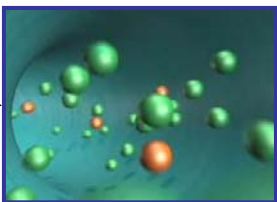
Easy & fast integration of feed and product lines to Membrane Skid



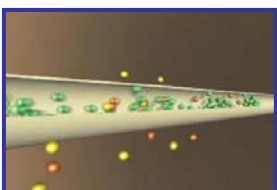
Pre-treatment with Coalescing Filtration Units



Pre-treatment with Activated Carbon or other appropriate media



Non-Permeate (Retentate) Product concentrating inside the Membrane Fiber

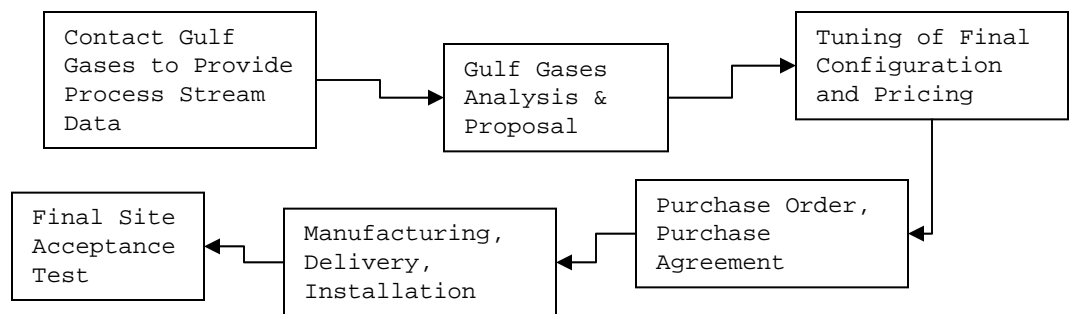


Permeate Product concentrating outside the Membrane Fiber

## Specifications:

Parameter	Design
Feed Flow Rates	From 100 to 1,000,000 scfh
Feed Pressure	From 100 to 500 psig
Feed Temperature	From -40 F to 130 F
Electric Power	220V or 480V, 60 Hz, 3 phase
Cooling Water	None required
Unit Weight	1,000 to 25,000 lbs per skid
Natural Gas Product Recovery	Up to 95%
Control System	PLC-based
Remote Monitoring	Option
Product Analyzer	Option
Electronic Flowmeter	Standard
Electrical Classification	Standard is Non-Haz., Optional is Haz.
Pre-Filtration	Standard
Fully Fabricated, Skid Built	Standard
Typical Delivery	6 to 9 months after order

## Project Development Steps:



Smaller Base-Plate Constructed Units



Larger Skid Fabricated Units

For **More Information**, contact Gulf Gases at 281-454-4224, or [support@gulfgases.com](mailto:support@gulfgases.com)