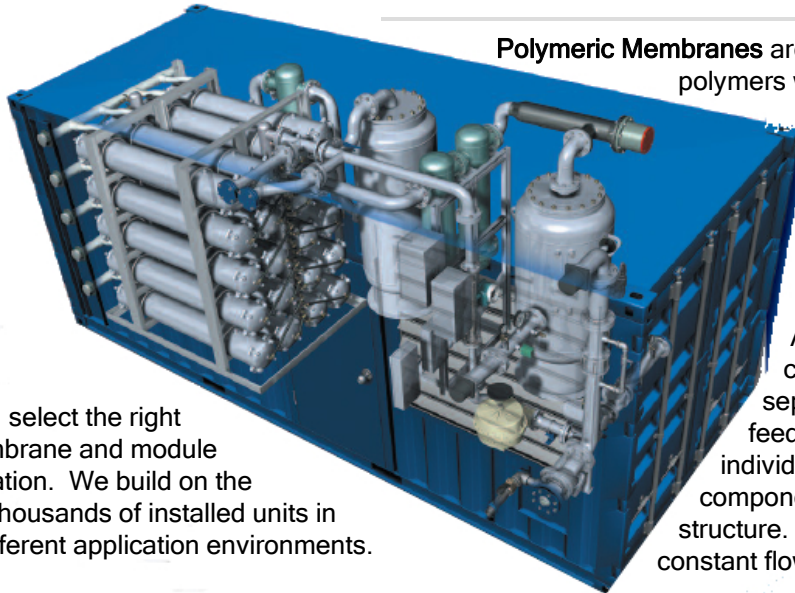


Membrane Systems for Syngas & H₂ Applications

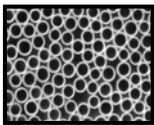
>> modularized, custom-designed polymer-based membrane systems with proven performance.

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 your syngas, H₂, or CO streams, plus any related trace compounds & impurities.



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 syngas, H₂ and CO related process needs.

After pre-treatment to remove coalescents and particulates, the separation of gas components in a feed mixture is performed by the individual permeation rate of each component through the membrane wall structure. Production is continuous at constant flow, pressure and purity.



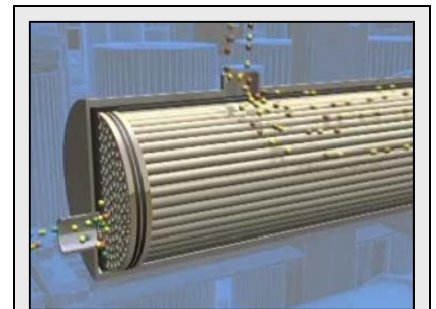
Gulf Gases will select the right polymeric membrane and module for your application. We build on the experience of thousands of installed units in hundreds of different application environments.

Applications:

- H₂ production from recovery of any pressurized vent and purge sources,
- H₂ production from recovery vents at Methanol, Ammonia, Hydrocracker, Hydroprocessor, IGCC plants,
- H₂ production from recovery of vent gases from metal treatment furnaces,
- Syngas Plant ratio adjustments of H₂ and CO,
- CO purification or production from pressurized Syngas feeds,
- CO₂ removal from H₂ or CO feeds,
- 2-step processing with conventional PSA Units to improve H₂ recovery %percent,
- H₂ recovery & recycling in biogas hydroprocess plants
- H₂ production in Waste to Syngas plants,
- H₂ & N₂ ratio adjustments in Dissociated Ammonia cracked gas.

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 H₂ are quick to migrate and rapidly concentrate on the permeate side of the Membrane. Slower permeates such as CO and CO₂ will become concentrated on the feed side of the membrane.

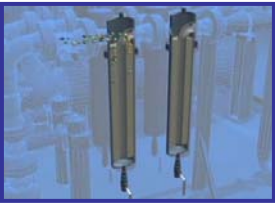


Membrane Systems for Syngas & H2 Applications

Process Flow:



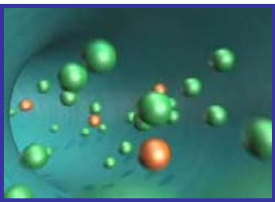
Easy & fast integration of feed and product lines to Membrane Skid



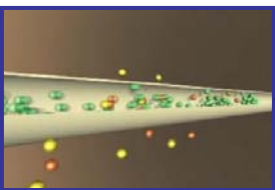
Pre-treatment with Coalescing Filtration Units



Pre-treatment with Activated Carbon or other appropriate media



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

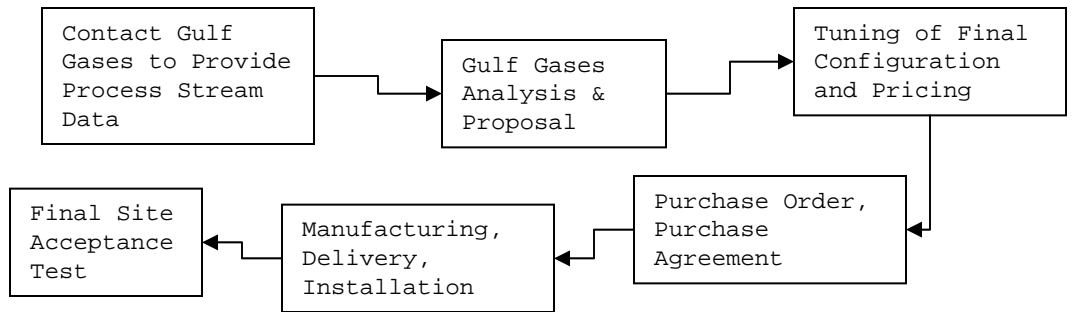


Permeate Product concentrating outside the Membrane Fiber

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
H2 Product Recovery	Up to 90%
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 281-454-4477, or support@gulfgases.com