GENERON® MEMBRANE TECHNOLOGY

Natural Gas Sweetening Systems

CO_2 is commonly found in natural gas. In order to meet pipeline specifications or other application specific requirements, the CO_2 has to be removed. In addition, there may also be H_2S and H_2O present that needs to be removed. Membranes have been widely used for CO_2 removal applications and come with the added benefit of removing H_2S and H_2O as well.

GENERON's CO_2 removal membrane systems offer some of the highest hydrocarbon recoveries achievable (with membranes) due to our high (CO_2 / CH_4) selectivity membrane. The customized CO_2 removal membrane systems are fabricated at our Houston, Texas facility while the membranes are fabricated at our Pittsburg, California facility. **GENERON** works directly with the client to provide the most efficient and most cost effective solution.

In a typical **GENERON** CO_2 removal membrane system the feed gas is first filtered to remove any entrained liquids and aerosols. The gas then enters the GENERON® membrane modules. The CO_2 as well as the H_2S and H_2O permeate preferably through the membrane. The non-permeated gas, mainly CH4, remains at pressure and is the product gas.

Membrane CO_2 and H_2S Removal

In a typical **GENERON®** membrane gas dehydration system, the eed gas is filtered to remove any entrained liquids and aerosols. The gas then enters the GENERON® membrane modules, where the H_2O, CO_2 and H_2S permeate through the membrane. The non-permeated gas, mainly CH_4, remains at process pressure and is the product gas.

Pressure Swing Adsorption

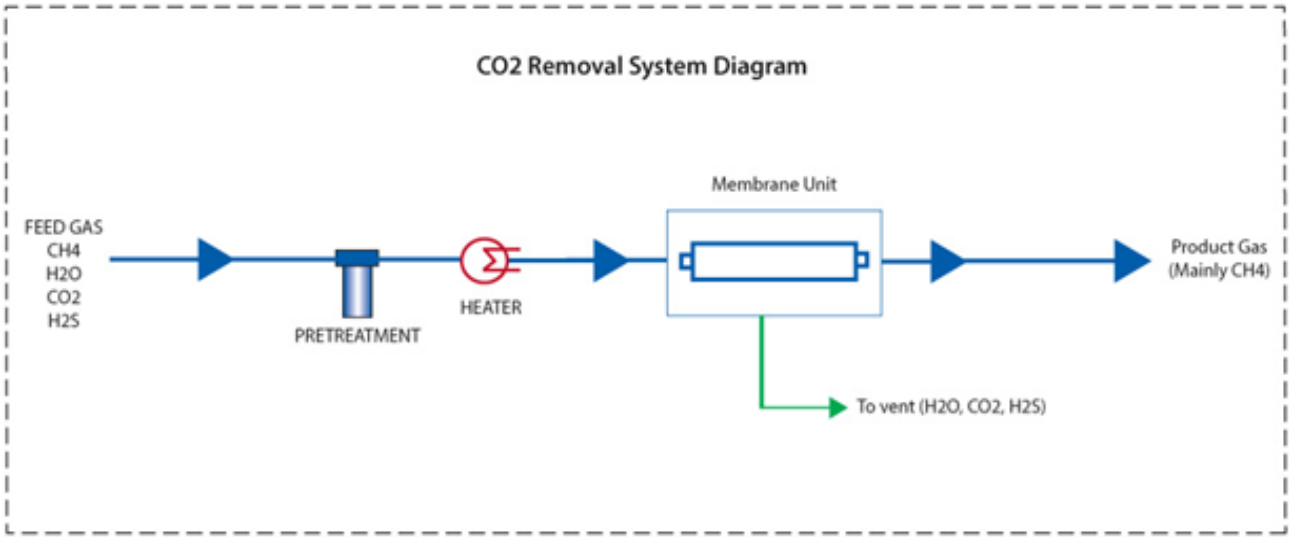
There are several molecular sieves that process the physical characteristics to adsorb CO_2 and H_2S from natural gas. These desiccants are generally used for Pressure Swing Adsorption systems consisting of two or more towers. While one tower is on-line adsorbing sour gases from the feed gas, the other tower is being regenerated. The towers are switched just before the on-line tower becomes fully saturated with sour gases. This system has an advantage in that its molecular sieve is non-toxic, non-corrosive, and can be

The GENERON® Advantage

- **Extensive Experience** - custom designed skids
- **State-of-the-art Membrane** - high recoveries
- **Simple Solution** - no moving parts, minimal maintenance
- **Remote Operation** - Minimal attention required, fully automated systems
- **Minimal Losses** - low HC losses
- **No Chemicals** - environmentally friendly
- **Small Footprint -** easily meet footprint requirements

Nitrogen Membrane® Systems

Natural Gas Sweetening



- GENERON helps customers choose the right system regarding their gas application and provides custom designed units that meet customer specifications.
- Our ASME vessel shop (HVM) builds our columns and separators in house, which makes our quality, delivery time, and pricing extremely competitive.
- GENERON facilities are ISO 9000 Certified and follow NEC/CEC (USA & Canada), ATEX (Europe), AS/NZS (Australia), IECEx (Worldwide) requirements.

SYSTEM PERFORMANCE:

- Feed gas pressures up to 1,000 psi (69 bar)
- > 60 vol % CO2 in feed
- < 2% CO2 content in product>
- >98% recovery of hydrocarbon gas
- > 90% removal of CO_2
- Flow rates from 0.01 to 100 MMscfd

APPLICATIONS:

- Pipeline gas applications
- Biogas or digester gas
- Enhanced oil recovery (EOR)
- CO_2 capture from stack / flue gas
- Fuel gas conditioning
- Syngas from steam-reforming of natural or biogas
- Methanol cracking
- H2-PSA purge gas
- Methanol Production
- Gasification plants (IGCC)

GENERON
16250 Tomball Parkway
Houston, Texas 77086
O - +1 .713. 937.5200
F - +1 .713. 937.5250
www.generon.com

GENERON

QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001