

Guild Associates, Inc.

5750 Shier-Rings Road
Dublin, OH 43016
Phone: (614) 798-8215
Fax: (614) 798-1972

Molecular Gate[®] Systems to Remove CO₂ and Water for LNG Pre-treatment



Natural Gas Treatment Unit

LNG is growing in applications for small scale stranded gas reserves, for peakshaver units for natural gas storage and for world scale production facilities. Prior to liquification CO₂ and water must be removed to ppm levels and in some instances nitrogen removal is also desired.

Historical LNG Pretreatment

Historically, where the CO₂ level is less than 1%, CO₂ and water are removed using thermally regenerated adsorption units (TSA) using molecular sieve adsorbents. These historical systems are relatively large and complex due to the large quantity of adsorbent required to remove the CO₂ and also require considerable heat input for regeneration.

Where natural gas CO₂ levels exceed 1% it is common to use an amine system for bulk CO₂ removal and then to follow the amine system with a TSA unit for residual CO₂ removal and dehydration. Overall this is an expensive and complex processing train.

Molecular Gate Alternative

Molecular Gate systems are well proven for the removal of N₂ or CO₂ (or both) from contaminated natural gas and have been applied in over 30 systems to produce pipeline and LNG specification product. These systems are also offered as a simplified alternative to historical processes for the single step dehydration of natural gas along with the removal of any quantity of CO₂ to 50 ppm or as required by the liquefier.

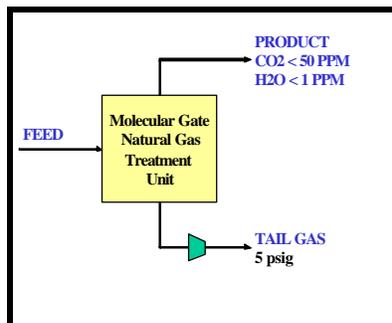
In the Molecular Gate system CO₂ and water are adsorbed at high pressure while the purified natural gas passes through the adsorbent bed at near feed pressure. The adsorbed CO₂ and water is subsequently removed at low pressure and leave the system along with any un-recovered hydrocarbons for use as fuel.

The Molecular Gate system also co-removes any C₄+ in the feed, which can be desirable for liquefier operation.

Adsorption systems for LNG pretreatment are appropriate for a wide range of flows from 0.5 MMSCFD to 20 MMSCFD, or more. System turndown is to zero flow and systems are noted for ease of operation, environmental friendliness with high reliability

Nitrogen and CO₂ Rejection

Where the targeted feed gas for the LNG plant contains high levels of nitrogen the Molecular Gate system can be used to remove both CO₂ and nitrogen in a single step. The Molecular Gate technology is noted for its ability to remove nitrogen to pipeline specifications (typically 3-5%) and LNG pretreatment using Molecular Gate for LNG would remove nitrogen to similar levels while also removing the CO₂ to less than 50 PPM.

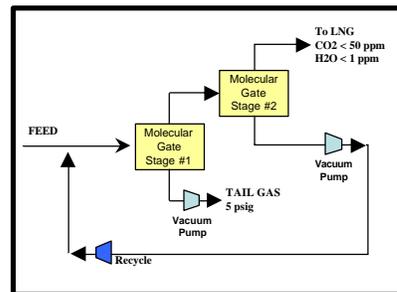


Single Stage PSA based LNG Pre-treatment

Technology Portfolio

Guild Associates provides adsorption-based systems for dehydration, hydrocarbon dew point control, CARB specifications, N₂ rejection and CO₂ removal. Systems provided include both thermally regenerated systems (TSA) and pressure regenerated systems (PSA).

For higher levels of CO₂ or for the need to improve the methane recovery to the LNG plant a two stage design can be incorporated. The first stage can be PSA or other bulk CO₂ removal technology.



Two Stage LNG Pre-treatment

About Guild Associates

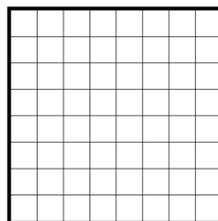
Guild Associates provides adsorption and catalyst systems to a variety of markets as well as shop fabricated engineered systems. Guild is the licensee of the Molecular Gate[™] technology originally developed by Engelhard Corporation (now a part of the BASF Group) and has provided all systems to date.

Contact

To learn more about Guild adsorption technology contact Michael Mitariten by phone at 908-752-6420 or by email at mike@moleculargate.com.

You can also visit us on the Internet at www.moleculargate.com.

Guild is a licensee of Molecular Gate[®] Adsorbent Technology and Guild is solely responsible for all representations made herein.



Guild
Associates, Inc.

5750 Shier-Rings Road
Dublin, OH 43016
Phone: (614) 798-8215
Fax: (614) 798-1972

All trademarks identified by ã or â are trademarks or registered trademarks, respectively, of Engelhard Corporation (now a part of the BASF Group). All other trademarks are the property of their respective owner.