

Filtration Applications in Gas (Amine) Sweetening Systems



Gas Sweetening is a critical procedure in gas processing facilities. To meet sales specifications and maintain efficient operation, natural gas goes through a sweetening process to remove contaminants; primarily H_2S because of its corrosiveness and CO_2 for its lack of heating value. Amine solvents are widely used to remove these contaminants from natural gas or lighter hydrocarbon products. Typical industries that perform gas sweetening includes: gas production sites, gas processing plants, refineries, LNG facilities, petrochemicals, etc.

Because of its highly corrosive and contaminant laden environment, amine processes require an optimum filtration/separation system to operate properly. Seldom is a single contaminant responsible for amine system operating problems. These contaminants can include fine solid particulates such as iron sulfides and liquid hydrocarbons in aerosol form.

The Benefits of an Optimum Filtration/Separation System include:

- Ability to meet sales gas specification and maintain efficient operation
- Reduction in absorber (contactor) plugging
- Prevention of amine foaming
- Reduces the use of costly anti-foaming inhibitors
- Reduction in equipment fouling
- Increase carbon bed life
- Reduced amine consumption
- Lower operating and maintenance costs

The most common filtration problems in an amine unit are foaming and fouling. Foaming will reduce effective absorption in the contactor tower resulting in high amine carryover rates and replacement costs. Treatment of the gas extraction will dramatically decrease resulting in reduced flow and the injection of costly foaming inhibitors to regain control of the amine system.

Fouling occurs from excessive particulate concentrations and can lead to poor amine/feed gas contacting and off-spec gas. Resulting problems include: tray plugging in the absorber and regenerator towers, heat exchanger/reboiler failure, carbon bed fouling, etc. In addition, corrosive contaminants can degrade amine strength, decrease gas treatment capacity, increase energy usage, and lower equipment life.



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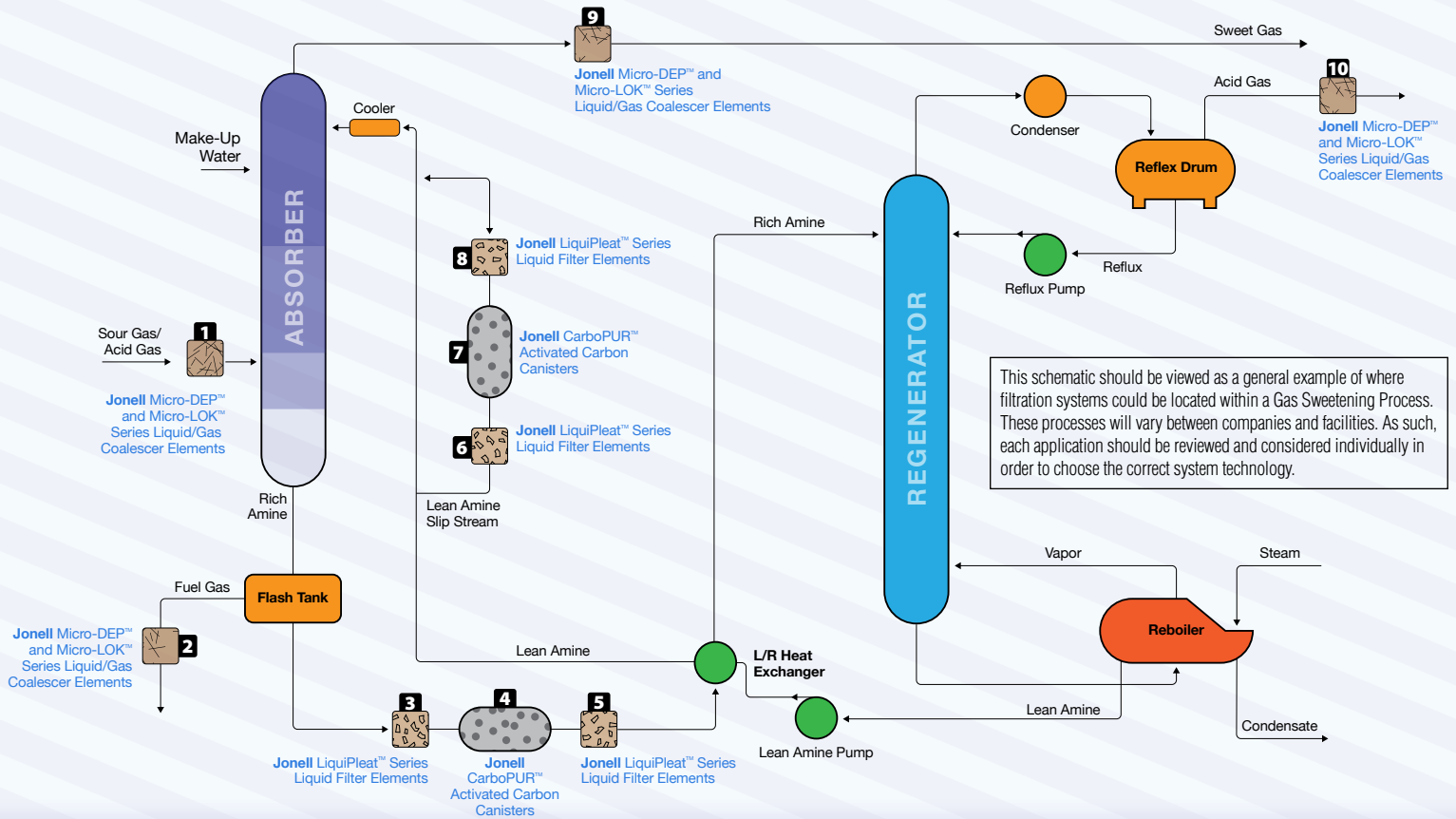
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Jonell Filtration Solutions for Gas (Amine) Sweetening Process



- Inlet gas enters the bottom of the absorber/contacter column flowing upwards through a series of trays and is countercontacted with the aqueous amine solution absorbing the acid gas in the amine.
- Purified (sweet) gas exits at the top of the absorber/contacter column.
- Rich amine solution, which has H₂S and CO₂ molecules attached, leaves the absorber and flows to a flash tank then passes through a Lean/Rich cross exchanger to the upper section of the regenerator/stripper column.
- The rich amine is heated in the regenerator/stripper column by contacting hot vapors from the reboiler causing the acid gas molecules to be stripped from the amine, thereby regenerating the solution.
- Steam and acid gases separated from the rich amine are condensed and cooled.
- The stripped acid gas typically flows to a sulfur plant for further processing.
- The condensed water is separated in the reflux accumulator and returned to the still.
- The hot lean amine from the reboiler is circulated back to the absorber/contacter after passing through the lean/rich amine cross exchanger and a lean solution cooler.

Location	Jonell Filter Solution	Filter Purpose	Filter Benefit
1	Micro-DEP™ and Micro-LOK™ Series Coalescer Elements	Removal of hydrocarbon, water, and other liquids and solids from sour gas feed.	Reduces absorber foaming and fouling, increases absorption and carbon bed efficiency.
2	Micro-DEP™ and Micro-LOK™ Series Coalescer Elements	Removal of carried over amine, water, and heavy hydrocarbons.	Maintains fuel gas quality and protects downstream equipment.
3	LiquiPleat™ Series Liquid Filter Elements	Removal of scale and solid contaminants and protect the carbon filter system.	Prevents carbon bed plugging, fouling in the reboiler and heat exchanger, and reduces foaming problems.
4	CarboPUR™ Series Activated Carbon Canisters	Removal of dissolved organic acids produced by amine degradation and trace liquid hydrocarbons.	Reduces amine foam in the regenerator (stripper) and degradation in the reboiler.
5	LiquiPleat™ Series Liquid Filter Elements	Removal of carbon bed fines.	Protects downstream equipment. Prevents heat exchanger and reboiler fouling.
6	LiquiPleat™ Series Liquid Filter Elements	Removal of scale and solid contaminants including iron sulfites and protect the carbon filter system.	Reduces foaming problems, prevents carbon bed plugging, and prevents absorber fouling.
7	CarboPUR™ Series Activated Carbon Canisters	Removal of dissolved organic acids produced by amine degradation and trace liquid hydrocarbons.	Reduces system corrosion and foaming tendency, and maintains solvent activity.
8	LiquiPleat™ Series Liquid Filter Elements	Removal of carbon bed fines.	Protects downstream equipment and prevents fouling in the absorber.
9	Micro-DEP™ and Micro-LOK™ Series Coalescer Elements	Removal of carried over amine.	Protects downstream equipment and processes.
10	Micro-DEP™ and Micro-LOK™ Series Coalescer Elements	Removal of water, amine, and liquid hydrocarbons.	Protects downstream equipment. Reduces maintenance and downtime costs at sulfur recovery unit.