



Problem

Common problems in an amine unit are foaming and fouling. Foaming in the contactor can result in huge amine losses, reduced operating capacity, and off-spec product. Amine carried over into the sweet gas can result in fouling of downstream equipment including compressors and burners. Foaming is initiated when condensable hydrocarbons enter the contactor with the feed gas and mix with the circulating amine causing a reduction in surface tension.

Fouling can result in reboiler tube failure, tray plugging in both the contactor and the regenerator, exchanger failures and frequent pump seal replacements. The typical contaminant is iron sulfide which is formed in the circulating amine system. Iron sulfide particulates tend to be less than 10 micron in size.

Pall Solution

Pall SepraSol™ Liquid/Gas coalescers are installed in gas feed line upstream of the amine contactor and remove virtually all of the entrained liquids in the feed gas. This eliminates the problem of hydrocarbons mixing with the amine, minimizing any problems with foaming.

Pall Nexis® T filters or Coreless Profile® filters are recommended upstream of the carbon bed to remove iron sulfide particulates from the circulation amine. Since the amine is a circulating system, the solids concentration will gradually increase unless removed by a filter. The high solids result in equipment fouling and stabilize foaming. The circulating amine should contain less than 1 ppm by weight of suspended solids and should be filtered to an efficiency of 10 micron (μm) absolute. This circulating amine system often requires that coarser filters be installed at first to clean the system of solids which have been accumulating over a period of time. Progressively finer filters are introduced to the system until a filter efficiency of 10 μm absolute is obtained. Pall Nexis T or Coreless filters are also installed downstream of the carbon bed to remove any carbon fines in the system.

In units where amine losses are significant due to operating at higher than design capacities, Pall's SepraSol Liquid/Gas coalescers are installed downstream of the contactor or regenerator overheads to recover amine. Pall offers a coalescer that is completely compatible in amine solutions.

Filter Recommendations

Filter Location	Recommended Pall Assembly	Purpose of Filtration	Benefits of Filtration
1	Pall SepraSol™ Liquid/Gas coalescer, CC3LG7A	Removes hydrocarbon, water and other liquids and solids from sour gas feed	Reduces foaming problems Increases absorption efficiency Increases carbon bed efficiency
2	Pall Nexis® T cartridge, 10 µm, Coreless Profile® - 10 µm filters	Removes scale, solid particles (e.g. iron sulfide)	Reduces foaming problems Prevents carbon bed plugging Prevents exchanger and reboiler fouling
3	Pall Nexis T or Coreless Profile cartridges, 10 µm	Removes carbon bed fines	Reduces foaming problems Prevents exchanger and reboiler fouling
4	Pall SepraSol Liquid/Gas coalescer, CC3LGB7H13 This product was specifically designed for amine and ammonia systems	Removes water, amine, and liquid hydrocarbon	Protects downstream equipment Decreases maintenance costs and downtime at sulfur recovery unit
5	Pall SepraSol Liquid/Gas coalescer, CC3LGB7H13	Removes carried over amine	Protects downstream equipment and processes
6	Pall SepraSol Liquid/Gas coalescer, CC3LG7A	Removes carried over amine, water, and heavy hydrocarbons	Provides quality fuel gas Protects downstream equipment

Locations

Gas processing plants
Petroleum refineries
Ammonia plants
Ethylene plants
Propylene plants

References

GAS 4301A – Texas Gas Plant
GAS 4302B – Analysis of Foaming Mechanism
GAS 4305 – Louisiana Gas Plant
GAS 4307A – Predicting Equilibrium Contamination Levels for Variable Slipstream Filtration
GAS 4100C – Guide to Gas Filter & Housings
PR-900 – Separations Technology in Petroleum Refining



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