



Amine Filtration

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Rich Amine Filtration Basics

In many cases it is necessary to have rich amine filtration. Primarily, if the regenerator contains structured packing it is prone to rapid fouling. Also, rich amine filtration is recommended if the installed lean/rich heat exchanger is a plate and frame type where narrow channels are readily suitable to solids deposition. In systems that are extremely contaminated with particulate due to inadequate feed preparation, excessive corrosion, or inlet gas with a high CO₂/H₂S ratio hindering passivation of the inner pipes of the unit, particulate filtration of the rich amine exiting the absorber may be required. The concern is that FeS in the rich amine can dissociate in the regenerator under certain conditions to soluble iron products which lean side filtration will not remove. These soluble iron products can then react with H₂S in the contactor to form additional FeS, fouling the absorber trays or packing. If components of the filtration system are installed on the rich amine stream, extreme care should be taken when performing maintenance to control the risk of exposure to H₂S.

Rich Amine Conditioning Recommendations

Suspended Solids Filtration: The use of rich amine filtration is justified in a few instances, especially if you have a rich amine with considerable suspended solids (> 5 ppm). It should also be used at full flow filtration if the regenerator has packing and prone to fouling. Also, if the heat exchangers suffer periodically from depositions, rich amine filtration is highly beneficial. The filter material should be compatible with rich amine service and be free of foam producing residues. It is always recommended to take extra precautions as maintenance in rich amine is more complex and presents higher risks compared to lean amine filtration. The filtration system should be installed downstream of the flash tank to avoid gas flashing in filter vessel (two phase flow can reduce filtration efficiency and corrosion at the interface). Filters installed upstream of the flash tank will quite often have inconsistent pressure drop readings rather related to gas flashing rather than element plugging.

Media selection can be somewhat more difficult compared to lean amine filtration but essentially the same guidelines will apply. It is important to mention that certain types of media can be unstable in the presence of some contaminants in the amine solution. One such example are materials that have high hydrocarbon affinity. These sometimes tend to deform themselves caused by absorption of the hydrocarbon phase leading to changes in efficiency. This property to some extent can have a positive side by remove a portion of the hydrocarbons in the amine solution; however, this comes at the expense of suspended solids filtration efficiency. In terms of media grade and efficiency, it is appropriate to use the same starting point as indicated for the lean amine filters. Medias with 50 microns and Beta 5000 ratings offer a good point of entry as the media efficiency is adjusted based on downstream contamination penetration, filter life and overall filtration cost.



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Hydrocarbons Removal (Emulsified Hydrocarbons): Hydrocarbons in rich amine are typically caused by poor inlet separation. The presence of hydrocarbons in rich amine streams are almost always associated with feed contamination, especially in the gas stream (i.e. heavy hydrocarbons, lubrication oils and others). The best way to combat this is to remove the contaminant at the source (upstream) or to protect the amine inlet with proper separation systems. However, when these avenues are not possible, the last resource is to use the flash tank to remove hydrocarbons. However, the residence time in these vessels is usually small and most emulsified hydrocarbons will not separate. It is then advantageous to have a liquid coalescer installed downstream of the flash tank and after the rich amine filters. Care has to be taken to protect adequately the coalescer and in not having too high of an initial coalescer efficiency as this will greatly reduce the on-line life of the system.

Activated Carbon Beds: It is not recommended to install activated carbon beds in rich amine circuits. There have been incidents with regenerator foaming and activated carbon decomposition associated with these systems installed in the rich amine circuit. Also, its maintenance has additional complications and safety aspects due to the rich amine stream.

For more information, please contact **Amine Filtration** at Help@AmineFiltration.com