



SepraSol™ Plus Liquid/Gas Coalescer Solves Foaming in Amine Unit

Application

A Middle East gas production company operates a major gas processing plant which produces sales gas and Natural Gas Liquids (NGL). The plant processes non-associated and associated gas from onshore oil production plants. After a compression stage, the sour feed gas is processed through the Acid Gas Removal Unit (AGRU), or the amine unit, to remove acid gases prior to the dehydration units and the cold section.

The plant operates two trains in parallel, each having a capacity of 385 MMSCFD (455,000 Sm³/hr). According to the initial plant design, each absorber was protected by three non-Pall horizontal filter-separators being operated in parallel, two in operation and one in stand-by, with a removal rating of 0.5 micron.

Amine units require an efficient protection to prevent the ingress of liquid and solid contaminants inside the absorber along with the sour gas. Liquid hydrocarbons and solid particles are foaming promoters because they lower the surface tension of the amine and they stabilize foam skins. Consequently, it is critical to effectively remove them down to very low levels prior to entering the contactor. Even contaminants of very small sizes can be extremely detrimental as they can cause severe operating issues such as foaming in the absorber, loss of amine due to carry-over, excessive use of anti-foams, process upsets in the sulphur plant, etc.

Problem

From the start-up of the plant, severe amine foaming issues were reported which were affecting the gas throughput, were causing amine carryover and were requiring a continuous injection of foaming inhibitors. In addition, fouling of the reboiler tubes in the regenerator were reported.

Foaming issues were suspected due to liquids entering the absorber, as a result of the poor separation performance of the upstream horizontal filter-separators. The volume of liquids being drained from the filter-separators was very small. The plant made several attempts to solve the problem. The three filter-separators were operated in parallel but this

did not improve the situation.

Pall Corporation was invited by the company a few years earlier to perform a site survey on another plant operating in the same configuration, in order to evaluate the liquid contents in the gas stream at different locations along the process. Field measurements were carried out by Pall's Scientific & Laboratory Services (SLS) team, a global group of highly skilled scientists and engineers. SLS trials highlighted very significant liquid carryover downstream of the filter-separators, with liquid contents above 1000 ppmw, which confirmed the root cause of the foaming issues in the absorber.

Solution

The company already had very good experience with Pall's high-efficiency liquid/gas coalescers that were being used in other units within the same complex. Pall's coalescers were also being supplied as replacements of similar horizontal filter-separators.

After the solution was defined with the plant through several technical meetings, a major local contracting company, who was previously awarded another debottlenecking project, was requested by the plant to include the installation of two new SepraSol Plus liquid/gas coalescers in their scope. For the time being, Pall's coalescers are installed downstream of the existing filter-separators.



SepraSol Plus liquid/gas coalescer

Each coalescer vessel is designed for a gas flow rate of 385 MMSCFD (455,000 Sm³/hr) and for a liquid content of 1965 ppmw. Coalescer vessels have a 3500 mm (138 in) inner diameter and are 7000 mm (23 ft) tall. They are equipped with an inlet gas distributor, a horizontal mesh pad, and the upper tube sheet is equipped with SepraSol Plus coalescer cartridges, plus extra blank plugs for future possible debottlenecking of the coalescer.

Benefits

By better removing liquids from the sour gas, Pall's coalescers provide:

- Absolute protection of the absorber
- Consistent and reliable operation of the amine unit

In combination with an efficient filtration of the amine solution, the result is:

- No foaming incidents
- Constant throughput
- Reduction of anti-foam consumption
- Reduction of amine consumption due to make-ups
- Reduction of maintenance costs on reboiler tubes

Conclusion

The amine unit is an important unit at all Gas Processing, Natural Gas Liquids (NGL) Recovery and Liquefied Natural Gas (LNG) production plants. If the quality specifications are not met downstream of the amine unit, corrosion may be experienced in the export gas pipeline or plugging in the cold section, with very severe consequences on the production.

Liquid contaminants, or aerosols, present in gas streams are very fine in size, typically in the micron and sub-micron range. Although they are fine, they are detrimental to the amine unit and they must be removed effectively. All incoming liquids are indeed absorbed in the amine solution, regardless of their size. Liquid/gas separation technologies such as vane packs, demister pads, filter-separators, cyclonic separators, and conventional cartridge coalescers are commonly used in the industry. However, conventional separators are unable to remove fine aerosols and can't protect the absorber properly.

SeptraSol Plus liquid/gas coalescers are capable of separating both the large droplets and sub-micron size aerosols, and are a proven solution for numerous critical liquid/gas separation applications found in the Oil & Gas industry.



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