

## Refineries: Application Focus

### Acid Gas Removal Unit (AGRU)

#### Process Description

Acid gas removal processes utilize amines or specialty solvents to remove acid gases such as H<sub>2</sub>S and/or CO<sub>2</sub> from Refinery Fuel Gas (RFG) in order to meet the gas quality specifications. The sour gas is contacted with lean amine in the contactor tower. An acid-base reaction occurs, binding the acid gases to the amine with a weak bond. The rich amine then flows to a regenerator, where heat breaks the weak bond between the amine and the acid gas, releasing the acid gas and regenerating the amine for re-use. The acid gases exit the top of the regenerator for further treatment while the lean amine is recirculated back to the contactor in a recirculating loop.

Liquid amine treating can also be used to remove H<sub>2</sub>S from Liquid Petroleum Gas (LPG). In this case a liquid-liquid contactor is used to contact the lean amine with the liquid LPG.

Ensure your AGRU reliably supports your daily production quotas and environmental protection needs.



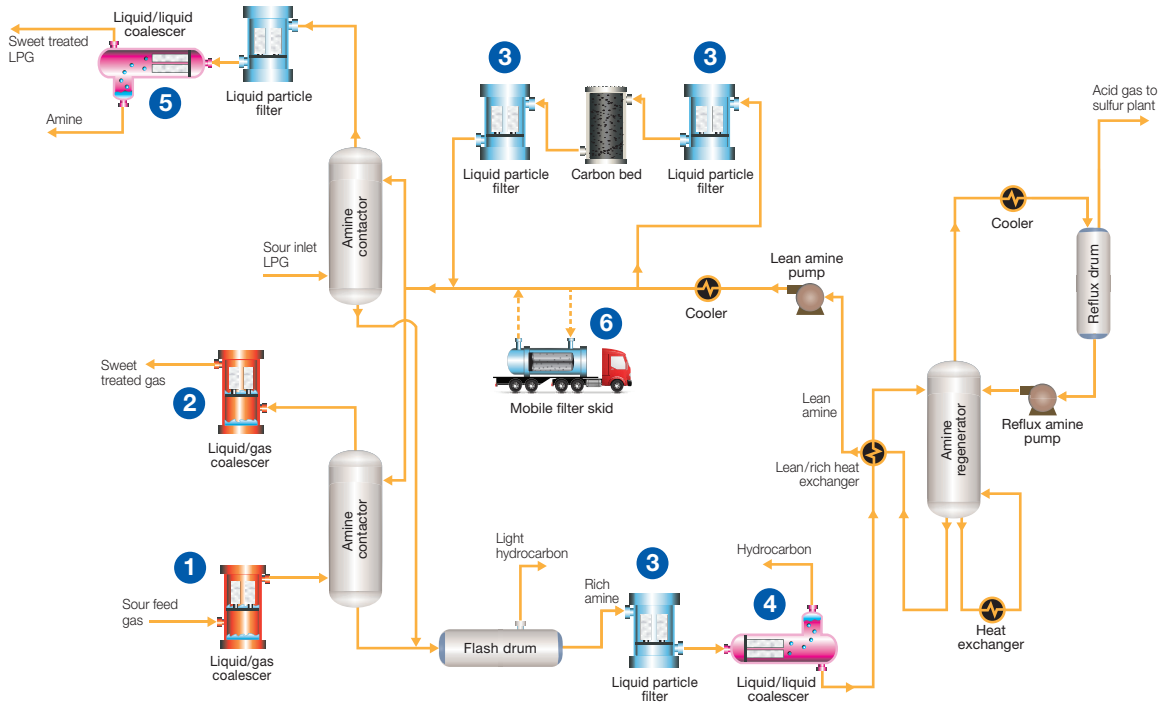
#### Refinery Needs

- Achieve oil production quotas via reliable treatment of acid gases that otherwise bottleneck unit operations
- Provide consistent fuel gas quality to ensure reliability of all burner operations across the refinery
- Minimize refinery off gas emissions through effective acid contaminant removal from the RFG

#### Production Challenge/Pall Solution

Challenge	Solution
<b>Reduced refinery shipments due to AGRU operational issues curtailing gasoline, jet fuel and diesel production</b>	<p><b>Improve refinery productivity and reliability with consistent RFG quality</b> by controlling AGRU foaming and fouling via effective liquids and solids removal upstream of the contactor to protect the amine loop.</p> <ul style="list-style-type: none"> <li>• KO pots, mesh pads, cyclonic devices and conventional filter-separators may not effectively remove aerosol-sized liquid hydrocarbon droplets or fine solids.</li> <li>• High efficiency SepraSol™ Plus liquid/gas coalescers and Medallion™ HP liquid/gas coalescers provide 99.999% removal at 0.3 microns per the DOP test and 1 ppb downstream per the modified ANSI/CAGI-400-1999 test procedure. <b>Both provide excellent foaming protection.</b></li> <li>• High efficiency coalescers can also be used downstream of the contactor on the sweet gas to recover amine mechanical losses and prevent carryover of amine into downstream RFG.</li> </ul>
<b>Environmental exceedances due to venting of offspec RFG from poor AGRU operation</b>	<p><b>Environmental compliance in the AGRU</b> by control of foaming and fouling issues.</p> <ul style="list-style-type: none"> <li>• Solid particle contaminants in amine systems are mostly very fine corrosion products that may not be adequately removed by filters that exhibit unloading, media migration, channeling or poor sealing.</li> <li>• A range of absolute and nominal rated filter elements is available to <b>reduce suspended solids to &lt;5 ppmw, keep the amine clear, and reduce foaming and fouling issues.</b></li> <li>• For enhanced solids control, add filtration to the rich side. Total sour gas worker exposure will typically be lowered due to the reduced system maintenance on the rich side.</li> </ul>
<b>Caustic treater upsets from amine carryover in the sweetened LPG</b>	<p><b>Freedom from caustic treater upsets</b> due to amine carryover from liquid amine treaters.</p> <ul style="list-style-type: none"> <li>• Install a high efficiency liquid/liquid coalescer downstream of the liquid contactor to remove residual amine and ensure corrosion test quality is achieved.</li> </ul>
<b>Rapid cleanup need</b>	Apply mobile filter or liquid/liquid coalescer skids.

## Process Flow Diagram



### Key Applications/Filter Recommendations (other applications not shown)

Application	Pall Product	Advantages	Customer Benefits
1 Contactor inlet coalescer	SepraSol Plus liquid/gas coalescer Medallion HP liquid/gas coalescer	Efficient removal of total hydrocarbon and solids upstream of the loop	Refinery productivity, reliability and compliance via AGRU protection from slug upsets
2 Contactor outlet coalescer	SepraSol Plus liquid/gas coalescer Medallion HP liquid/gas coalescer	Specially formulated B grade coalescer media is compatible with amine	Improve burner reliability and reduce burner maintenance by removing amine carryover
3 Amine filter (Add rich side for enhanced performance)	Ultipleat® High Flow filters, Coreless filters, Marksman™ filters, Profile® II filters, Nexis® filters, or a range of Pall FSI bag filters	High filtration efficiency, reproducible performance, easy changeout, and long filter life	Refinery productivity, reliability and compliance via AGRU protection from foaming and fouling causing RFG issues
4 Liquid hydrocarbon removal from amine	PhaseSep® liquid/liquid coalescer	Proven performance for hydrocarbon liquids removal	Reduce upsets in downstream sulphur plant
5 Amine removal from LPG	PhaseSep liquid/liquid coalescer	High efficiency specially formulated coalescer media	Improve caustic treater reliability, meet LPG quality specs (corrosion test)
6 Depollution/cleanup filter	Mobile filter or liquid/liquid coalescer rental skid	Fast, reliable cleanup of high solids or hydrocarbon liquids levels	Rapid recovery from upsets, return to refinery productivity, reliability, compliance



#### Fuels and Chemicals

25 Harbor Park Drive  
Port Washington, New York 11050  
+1 516 484 3600 telephone  
+1 888 873 7255 toll free US

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