

LPG-MAXSM

Dual Reflux C₃⁺ Recovery

Overview

Lummus Technology's proprietary Randall Gas LPG-MAXSM process is a two-tower, turbo-expander, high propane recovery process.

This two-tower scheme consists of an absorber and a deethanizer column. This technology rejects essentially all of the ethane, while recovering 99+% of propane and heavier components. The key to propane recovery is an additional lean reflux stream to the absorber obtained from the residue gas.

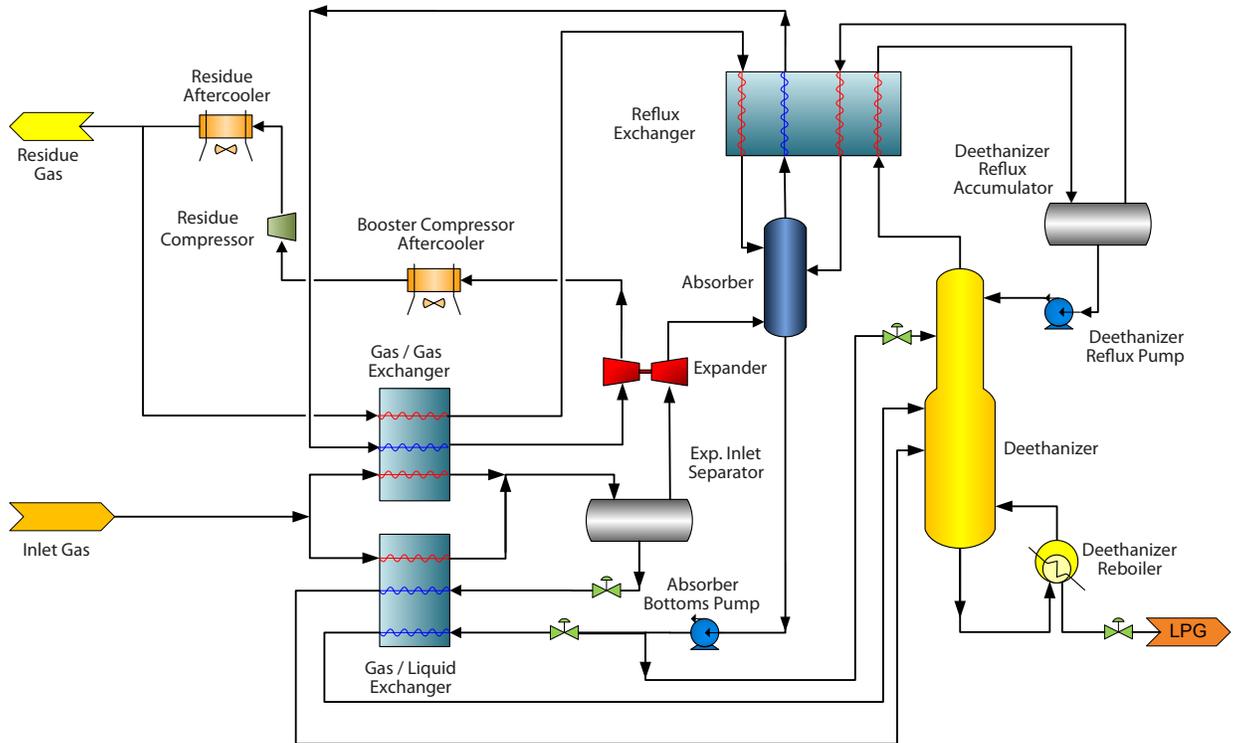
A simplified scheme, without a reflux system, is available which reduces capital cost, however propane recoveries are somewhat lower (93 to 95%).

Depending on the market conditions, the process can also be configured for partial ethane recovery or operated without residue lean reflux for maximum throughput.

Advantages

Process Features	Process Benefits
Applicability	<ul style="list-style-type: none"> Operability over a wide range of pressures, temperatures and compositions Flexible process to maximize product recovery
Thermal Efficiency	<ul style="list-style-type: none"> Less residue compression than other industry alternatives Two sources of lean reflux to the absorber for high product recovery
Operability	<ul style="list-style-type: none"> Maximum efficiency turbo-expander design JT operation also available Adjustable residue reflux for optimum recovery and throughput for varying feed compositions
External Refrigeration	<ul style="list-style-type: none"> Normally not necessary for lean gases May be needed to optimize recovery with heavier gases
CO ₂ Tolerance	<ul style="list-style-type: none"> A higher pressure absorber moves the operating point further away from the CO₂ freezing point, which results in less pre-treatment than many industry alternatives Operates further from CO₂ freeze point relative to processes with lower pressure absorbers Less pretreatment than many industry alternatives
Constructability	<ul style="list-style-type: none"> Designed for easy modularization

Process Flow Diagram



Process Description

This process description is of a typical LPG-MAX process.

An inlet gas stream is cooled and sent to the cold separator. In this separator, condensed hydrocarbons are knocked out, warmed, and partially vaporized before going to the deethanizer column. The vapor from the top of the cold separator is expanded, and then sent to an absorber column as bottom feed.

The absorber provides initial NGL separation. Reflux to the absorber is provided by a partially condensed deethanizer overhead stream and a second lean reflux stream is taken from residue gas after compression. The absorber bottoms stream is warmed while cooling the inlet gas and then sent to the deethanizer.

The absorber overhead (residue gas) is heated in the reflux and gas/gas exchangers before entering the compressor section of the expander/booster compressor. The residue gas is then sent to the

residue gas compressor which may be needed for further compression.

The deethanizer overhead is partially condensed by exchanging heat with the absorber overhead. The two-phase stream is then sent to the reflux accumulator. The liquid is pumped back into the deethanizer as reflux. The vapor stream is partially condensed by heat exchanging with absorber overhead stream, and then sent as top reflux to the absorber.

The deethanizer reboiler partially vaporizes the liquid from the bottom of the deethanizer. The column has a temperature controller at the tower bottom to control the amount of ethane and lighter components in the column bottom product by changing the flow of heat medium to the reboiler.

The deethanizer reboiler liquid stream contains the LPG product.

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