NGL-MAX℠
Dual Reflux C_2^+ Recovery

MCDERMOTT TECHNOLOGY

Overview

Lummus Technology's proprietary Randall Gas NGL-MAX℠ process is a multi-reflux, high ethane recovery process. The process offers superior flexibility to varying ethane recovery levels and adapts to uncertain/variability in feed gas composition and changing market values of products.

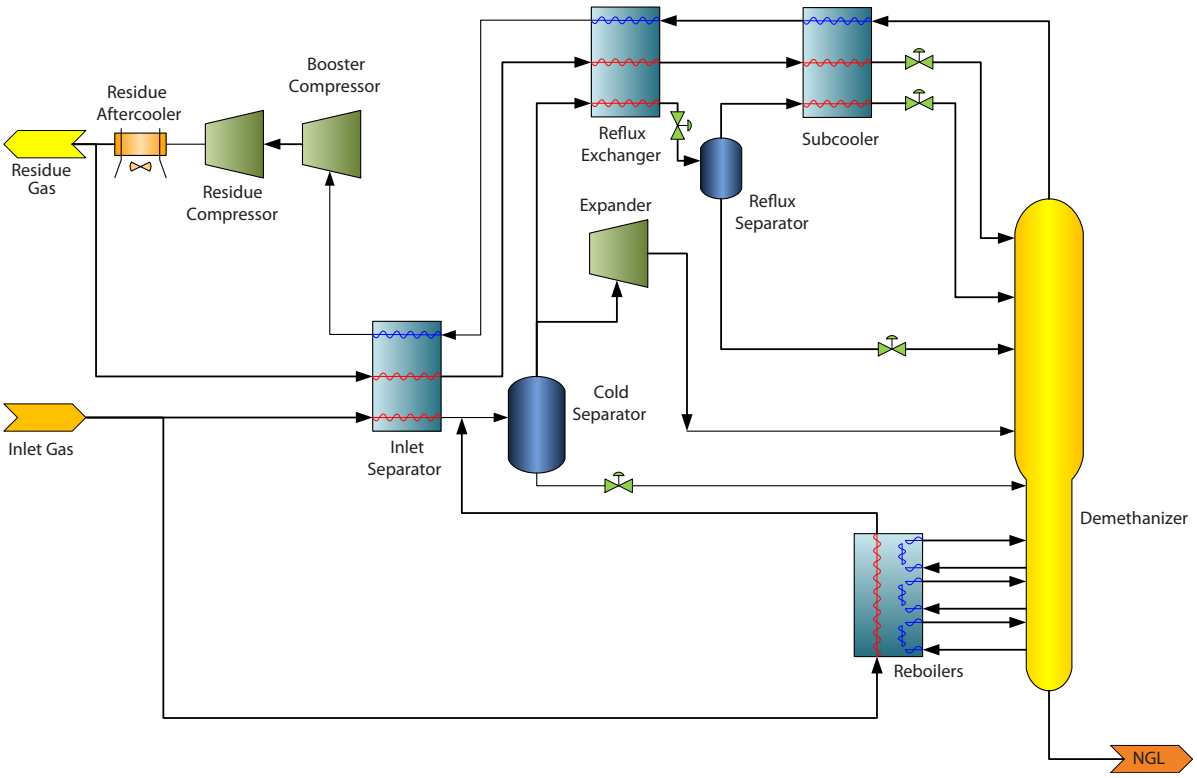
The technology recovers 99+% ethane from gas streams with essentially 100% of recovery propane and heavier components. The process uses semi-lean and lean reflux to achieve higher ethane recovery with higher efficiency than open art GSP type processes, requiring less compression power for recompression.

Additionally, the NGL-MAX process can be designed to run for dual operating modes – ethane recovery or propane recovery. This operational flexibility maximizes plant revenue depending on market conditions.

Advantages

Process Features	Process Benefits
Applicability	▪ Operability over a wide range of pressures, temperatures and compositions ▪ High (99+%) ethane recovery design
Thermal Efficiency	▪ Reduced residue compression from high pressure demethanizer
Highly flexible – Ethane Recovery or Rejection	▪ Dual operating mode/process designs available for ethane recovery or propane recovery (ethane rejection): – In ethane recovery mode, up to 99% ethane recovery – In propane recovery (ethane rejection) mode, up to 99% propane recovery with almost complete rejection of ethane – Capable of processing up to 10% additional feed capacities to maximize LPG recovery – No special advanced control system required for dual operation
Operability	▪ Maximum efficiency turboexpander design ▪ JT operation also available
External Refrigeration	▪ Normally not necessary for lean gases ▪ May be needed to optimize recovery with heavier gases
CO_2 Tolerance	▪ A higher pressure absorber moves the operating point further away from the CO_2 freezing point, which results in less pre-treatment than many industry alternatives ▪ Operates further from CO_2 freeze point relative to processes with lower pressure absorbers
Constructability	▪ Designed for easy modularization

Process Flow Diagram



Process Description

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

Clean and dry feed gas is split into two streams. One part of the stream is cooled against cold, low pressure, lean gas in the inlet exchanger and sent to the cold separator. The other stream is cooled in the demethanizer reboiler and sent to the cold separator.

Liquids leaving the cold separator are sent to the demethanizer. Vapor leaving the vessel is split. Some of the vapor is sent to the expander where its pressure is reduced. Due to the isentropic expansion process, work is extracted from the gas, and as a result the gas cools and partially condenses. This two phase stream is then routed to the demethanizer. The rest of the overhead vapor is further cooled in the reflux exchanger and sent to the reflux separator. Liquid from the reflux separator is sent to the demethanizer. Vapor leaving the vessel is further cooled in the subcooler before feeding the demethanizer as one of the top feeds.

The demethanizer reboiler is used to provide heat to the tower and control methane in the NGL liquid. The reboiler provides cooling for the feed gas, while using the feed gas to reboil the tower. Vapor leaving the tower is heated in the subcooler, reflux exchanger and inlet exchanger before being sent to the booster compressor.

The booster compressor is coupled to the expander and runs using power extracted by the expander. Low pressure lean gas is boosted in the booster compressor and sent for residue compression. After final recompression to sales gas pressure, a portionof the high-pressure residue gas stream is returned to the NGL-MAX process unit where it is cooled in the gas/gas exchanger and completely condensed. This condensed stream is used as top reflux stream to the demethanizer.

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