

FUEL GAS RECOVERY

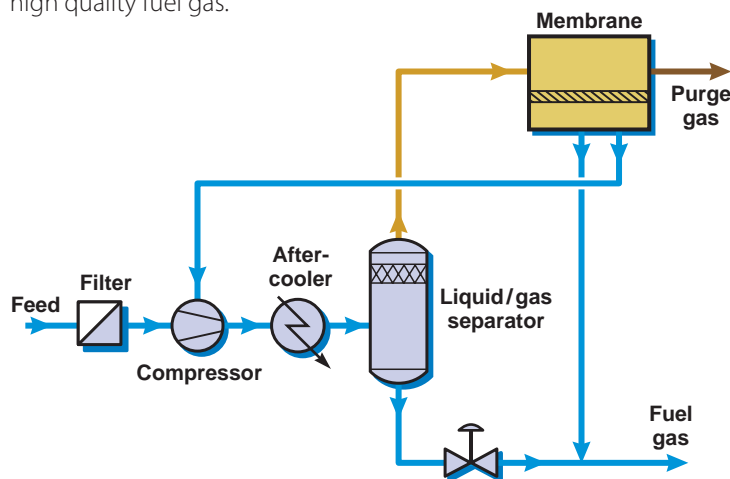
Problem

When polyolefins are produced in petrochemical plants, the PP/PE resin leaves the reactor saturated with un-reacted hydrocarbons. Before this “wet” resin can be used for the production of plastic containers (i.e. bottles, food containers, etc.), it is sent to a purge bin where it is purged with nitrogen to drive off the un-reacted hydrocarbons. As a result, an off-gas stream containing nitrogen and hydrocarbons is produced. This purge bin off-gas is usually burned at the flare header.

This off-gas contains a significant amount of hydrocarbons. Removing nitrogen from this stream upgrades it to fuel gas quality, so it can be used instead of purchased gas.

VaporSep® Solution

MTR’s VaporSep® system can easily separate the C₂₊ hydrocarbons from the nitrogen, producing a hydrocarbon-enriched stream that may be used as a high quality fuel gas.



“Converting a flare stream into a valuable fuel gas is a no-brainer.”

- Eliminates flaring
- Generates valuable fuel gas
- Minimizes installation cost with skid-mounted construction

The purge bin off-gas is first compressed from atmospheric pressure to around 22 bar. The compressed gas is then cooled and passed through a gas/liquid separator. The gas leaving the separator enters the membrane unit, where hydrocarbons permeate to the low pressure side more readily than nitrogen. The first permeate stream is rich in hydrocarbons and is used as fuel gas product. The second permeate is recycled to the compressor suction to enhance hydrocarbon recovery. The nitrogen rich residue stream is the treated purge gas — from which most of the valuable hydrocarbons have been removed.

The VaporSep® system includes a single low maintenance oil-flooded screw compressor, a membrane section and all ancillary equipment. The entire system is skid-mounted for easy installation.

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VoporSep® unit being checked prior to shipment

Benefits

- Recovers a hydrocarbon-enriched stream (containing < 10 mol% nitrogen) that can be used as valuable fuel gas
- Drastically reduces the loss of hydrocarbons being burned in the flare
- Operates at ambient temperature and does not require any refrigeration or low temperature metallurgy — a simple system

Process Parameters:

- Feed flow rate: 3 to 5 tons/hr
- Composition:
30 to 40 mol% nitrogen;
40 to 60 mol% C2+ hydrocarbons;
balance hydrogen
- Pressure: 1.2 bar
- Temperature: 60 to 70 C

System Characteristics:

- Unit dimensions:
30 ft (L) x 10 ft (W) x 14 ft (H)
- Weight: 80,000 lb
- Compressor power requirement:
1,000 kW

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