CECO Peerless

Gas Processing and Transmission

Natural Gas Dehydration Unit

Definition

Gas Dehydration is a widely used application in Gas Processing Plants. This process is carried out to remove moisture from natural gas to achieve the required water dew point for pipeline specification or for downstream processing like NGL extraction. This process is required to prevent hydrates formation at low temperatures and reduce corrosion problems due to the presence of carbon dioxide or hydrogen sulfide present in natural gas.

Based on the required outlet gas specification, the Gas Dehydration process is classified into the following processes:

- Glycol Based Gas Dehydration Process
- Molecular Sieve Gas Dehydration Process

Product Application:

- Offshore – Process Platforms/FPSO/MOPU
- Onshore – Gas Processing Plants/Refineries/ EPF

Process Description

1. Glycol Based Gas Dehydration Process:

Tri-Ethylene Glycol (TEG) is the most widely used chemical for Gas Dehydration Units (GDU). This process can achieve 3–7 lb/MMSCF of gas which is suitable for most Pipeline transportation specification. CAPEX and OPEX of this process is significantly lower than Molecular Sieve based Dehydration.

The wet gas from the well or compressor station is brought into contact with lean glycol in the Contactor column. The column is normally provided with structured packing which provides mass transfer surface.

Moisture present in the gas is absorbed in the lean glycol in a countercurrent absorption process resulting in reduction of water dew point. The rich glycol then flows from the absorber to TEG regeneration system in which the entrained gas and moisture is fractionated in a Column and Reboiler. The heating allows boiling off the absorbed water vapor. The lean glycol is cooled and pumped back into the absorber.

To achieve a higher degree of water removal from amine, fuel gas is used for stripping in the regenerator in order to achieve a higher glycol concentration.

A Glycol Dehydration Unit consists of:

- Inlet filter-separator (Optional)
- Gas After Scrubber/Gas Coalescer
- Glycol Flash drum
- Heat recovery STH exchangers
- Still Column
- Stripping columns
- Glycol pumps
- Glycol storage tanks (Optional)
- Control System (Optional)
- Glycol Contactor Column (with Integral Scrubber (Optional)
- Reflux coil
- Particulate/carbon filters
- Electric/hot oil/gas fired reboilers
- Reflux System (Optional)
- Glycol Surge vessel
- Chemical injection package (Optional)
- Fuel Gas Package for Reboiler (Optional)

2. Molecular Sieve Based Gas Dehydration Process

In order to avoid any hydrate formation during cryogenic process like LPG or NGL recovery, Molecular Sieve based gas dehydration Process is employed.

The molecular sieve based dehydration utilizes an adsorption process where moisture present in the gas is adsorbed on the surface of zeolite beds. The zeolite particles are available in various pore sizes (3–5 Å). Selection of media is critical for efficient operation of the system. CECO Peerless offers design with an optimized operation cycle resulting in extended life and higher efficiency.

In a standard process a two or three vessel design is used where one or two vessels is under drying cycle and the remaining vessel will be under regeneration mode. Rising Steam Switching Valves are used for switching from dehydration to regeneration mode.

A slip-up gas stream from the GDU outlet is compressed, superheated and then introduced to the vessel which is in regeneration mode. The principle of heating the molecular sieve removes the adsorbed water and the regeneration gas flows back to inlet of the unit gas.

A Molecular Sieve Dehydration Package consists of:

- Inlet filter separators
- Electric/Indirect Fired Regeneration Gas Heater
- Downstream filters
- Fuel Gas Package (Optional)
- Absorption tower
- Regeneration Gas Compressor
- Regeneration gas cooler and separator
- Control System (Optional)

Additional Services:

- Custom-built or Pre-Engineered Solutions
- Fast Track Delivery
- Modular Solution for Offshore and FPSO
- Rental Option also available
- Site Support including Installation and Commissioning Supervision

Product Benefits:

- 20+ years of field performance
- Proven and Reliable Design
- High efficiency Peerless Internals ensures minimal downtime
- Can be offered with Peerless Black Powder Filter Separator at inlet
- Compact footprint
- Low cost of operation and maintenance
- Compliance to stringent HSEQ requirements
- Modular Solution requiring minimum site works