PRODUCT / APPLICATION INFORMATION

Fuel Gas Skids/Compressors and Turbines

Background

Gas Compressor Stations are required on long distance gas pipelines to boost pressure and ensure adequate flow.

The compression facilities may consist of Low Pressure (LP) Reciprocating compressors, LP Turbine compressors or High Pressure (HP) Turbine compressors.

The fuel gas can be supplied to each compression unit directly from the Fuel Gas distribution header. The normal source for satellite fuel gas is raw gas from the discharge of the LP compressor which is processed through a Fuel Gas Scrubber to remove condensed water and hydrocarbons. A back-up supply can be sourced from a HP gas discharge header.

The Turbines which drive compression units can show evidence of damage to the fuel gas nozzles, combustors and turbine blades, as a result of high temperatures in the combustion chambers. This damage significantly shortens the service life of these components and increases the risk of catastrophic failure of the turbine blades.

Investigations by equipment manufacturers have concluded that the erosion and degradation is due to heavy

ends (C6+) in the fuel gas entering into the combustor in the liquid phase and causing high temperatures, flame impingement of the turbine blades.

Pressure changes in fuel gas line systems, can also cause the 'refrigerant effect' due to down stream pipe sizing changes/restrictions during flow conditions, resulting in upset system conditions with inline instrumentation and flow monitoring. If this decrease in temperature results in the gas falling below the dew point temperature, gas hydration will form. Even in tropical climates , the formation of hydrates is possible. Formation of hydrates in the gas creates problems for the compressors, for example friction wears out blades and damages the compressor itself. In severe cases such as in low ambient temperatures, ice can form within the gas lines blocking flow to cities and other critical operations.

When the Gas Compressor is in standby mode (no flow) heat loss will occur resulting in lowering of gas temperature to ambient. If ambient is below product dew point it will result in unwanted condensation in the following equipment:

- Main Gas Lines
- Well Heads
- Gas Compressor Stations
- Knock Out Pots
- Instrumentation
- Feed Lines from gas pre-heater to Turbine

Solutions

a) Concern of Turbine Damage: The recommendations are that the inlet temperature of the existing fuel gas to the turbines, during flow and operation, should be raised above the dew point of the existing fuel gas to avoid any resulting damage to the turbines or instrumentation performance issues due to low temperatures. This can be a maintain or heat up temperature application and the solution is to determine the anticipated heat loss under all conditions utilizing the Thermon Computrace design tool and select the best available Thermon heat tracing cable packaged system for the project.

b) 'Refrigerant Effect' & Formation of Hydrates: This is generally a Heat up application and therefore the combined values of the maximum flow rate (kg/second) under the worst case conditions, heat capacity of the gas (kj/kg/deg.C) and the required temperature increase will need to be known (as a minimum) by the Thermon design engineers, for calculation and assessment to determine and select the most suitable Thermon system for the project and end-user.

Purpose designed and purpose made Thermon MIQ high output heaters are excellent watts/metre value, and are very reliable for the long term and a superior heater cable solution for high power input applications.

There is also the range of Thermon BSX, RSX, KSX, HTSX, VSX Self-regulating heater cables and the HPT Power limiting cables that the Thermon design engineers can select and use where suitable.

All Thermon designed and selected heat tracing systems have the appropriate worldwide approvals and certification for electrically hazardous areas.

