Pipeline and Process Services

Nitrogen Services for Pipeline and Process Applications
Offering a Wide Variety of Cost-Effective and Efficient Nitrogen Services

The unique properties of liquid and gaseous nitrogen offer a wide range of capabilities to both onshore and offshore oil, gas and petrochemical industries. Used predominantly during plant maintenance shutdown and startup operations, nitrogen purging and subsequent nitrogen/helium leak testing form a critical path to the success of any project.

Halliburton nitrogen equipment can provide nitrogen to gas at flow rates up to 7,060 scf/min (200 sm3/min) at pressures ranging from nominal purging requirements up to 15,000 psi. Access to variable flow and pressure can result in time savings critical to any plant shutdown.

Applications for Nitrogen

- Nitrogen purging – displacement/pressure cycle
- Nitrogen foam inerting
- Helium leak testing
- Nitrogen foam cementing
- Nitrogen pigging
- Nitrogen drying
- Nitrogen cooling
- Nitrogen pressure testing
- Nitrogen high-velocity flushing
- Nitrogen gas lifting
- Nitrogen pipe freezing
- Nitrogen mothballing

Nitrogen Purging

Nitrogen purging is an industry standard technique for the replacement of a hazardous or undesirable atmosphere with an inert dry atmosphere. The two most common methods of purging are displacement and dilution. The geometry of the process system determines which method is used. For simple systems, displacement purging is usually more effective in terms of time and cost but, for more complex systems, dilution purging is used.

Nitrogen Drying

Using nitrogen offers a number of advantages for drying operations. Cryogenic nitrogen contains only trace quantities of moisture, making it very effective in drying operations (nitrogen gas dew point is between -80°F and -90°F [-62°C and -67°C]). Nitrogen provides an inert atmosphere for long-term preservation once the drying process is completed. This environment reduces oxidation and no purge is required after drying is complete. Nitrogen also provides time savings since it can be used to rapidly pressurize a system.

Nitrogen Gas Lifting

Nitrogen is used in well applications to reduce the weight of fluid in the wellbore. Nitrogen is pumped through coiled tubing (or gas lift tubing) and discharged at the well perforations. As the nitrogen gas flows up the production casing, it expands and reduces the weight of fluid in the column, allowing the well to flow.
**Nitrogen Pressure Testing**

In some circumstances, when hydrostatic testing is not possible, components or systems may be tested with nitrogen. However, system design specifications must be reviewed and a detailed risk analysis completed before testing with a compressible medium.

**Nitrogen Foam Inerting**

Halliburton's nitrogen foam inerting is a simple yet effective process that enables hot work to be carried out on hydrocarbon handling systems in complete safety. The nitrogen foam is injected into a process system at a low point and allowed to completely fill the vessel and pipework, rendering the internal atmosphere inert. On completion of hot work operations, the nitrogen foam degenerates into small amounts of water, surfactant and gaseous nitrogen.

Typical foam inerting applications include vessel and pipework modification and/or replacement, hot cutting and system decommissioning.

The Halliburton nitrogen foam package includes:

- Workshop container
- Ambient nitrogen vaporizer
- LN2 storage tank
- Foam mixing unit
- Foam induction gun
- LP purge hose
- LP transfer hose
- Surfactant
- Adapter flanges
- Fittings kit

All components of nitrogen foam are biodegradable and non-bio accumulative.

**Nitrogen Cooling**

During refinery shutdown, it is desirable to reduce the temperature of process catalysts as quickly as possible. Large volumes of nitrogen can be pumped by Halliburton’s pumping equipment to assist in the cooling process and save valuable hours of shutdown time.

**Nitrogen Pipe Freezing**

Liquid nitrogen, having a boiling point of -384.4°F (-195.8°C), has an application as a coolant in indirect pipe freezing systems. On pipework compatible with cryogenic liquids, liquid nitrogen can be used as the direct cooling medium.

Halliburton's pipe freezing approach provides a number of benefits over more conventional approaches:

- Time savings due to the “no draining operation”
- Costs savings as liquid waste is limited
- Repairs can be carried out without interruptions to the process system
- Provides isolation for pressure or leak testing
- Effective use of plant/platform personnel.

**Nitrogen Mothballing**

On completion of process system or pipeline commissioning, it will occasionally be necessary to protect the system from corrosion or degradation for a period of time. As nitrogen is an inert gas, it is ideally suited for this type of operation.

For more information about Halliburton’s nitrogen service for process and pipeline applications, visit [www.Halliburton.com](http://www.Halliburton.com), contact your local Halliburton representative or e-mail pps@Halliburton.com.