Safe operating conditions are essential to oil and gas processing systems. With ever increasing productivity demands and complexity of processing plants, the handling of high-pressure flammable or toxic fluids requires stringent safety standards. Compliance with such standards dictates the ability to locate and repair all leaks.

Helium Leak Detection (HLD) is the only method of accurately locating and quantifying system leaks. Conventional testing methods such as hydrostatic testing, visual inspection or soap solution are only qualitative and offer limited leak detection capability. Halliburton’s process, when combined with nitrogen as the pressurization medium, can identify leaks of 0.1 scf of gas per year. If 100% helium is used as the test medium, leak rates of 0.001 scf per year can be detected.

Incorporating HLD into your commissioning or startup activities is the proven best method for helping ensure safety from hazardous hydrocarbon leaks during startup and operations. This technology, combined with Halliburton’s project management capabilities, results in an auditable report confirming system integrity.

Why Use Helium?

- Rare in the atmosphere (5 ppm)
- Inert
- Safe
- Small molecular size
- Viscosity similar to process gas
- Readily detectable and quantifiable

Advantages of Using Helium Leak Detection

- The system is tested at, or as close to, its working pressure with a gas closely simulating “live” conditions
- Leaks are detected and quantified, making it possible to monitor them over a period of time to determine any deterioration of the joint
- The oxygen content is reduced, which avoids the potential for explosive gas mixtures when hydrocarbons are introduced
- Calibration of system instrumentation can be checked and operators can gain familiarity with the system during the leak test
- Helps save lost production, time and costs compared to repairing leaks after startup
- Helps assure that the health of personnel is not adversely affected by the escape of hazardous or poisonous liquids and gases
- Enhances the safe and extended operation of process plant and equipment
- Helps assure that the environment is not contaminated or polluted.

Acceptable Leak Rates

If leaks are present in a system, they must be maintained below the threshold that would endanger the health of personnel, compromise safe operation of the system or cause undesirable environmental impact. The petrochemical industry uses various accepted leak rates which vary depending on the fluids contained within a system. These levels vary from 1 scf/year (0.028 sm³/year) on odorant injection plants, to 5 scf/year (0.142 sm³/year) for offshore high-pressure gas processing systems, to 200 scf/year (5.66 sm³/year) for onshore oil terminals.

Leak rates are usually company-specific and have not yet been aligned to any specific international standard. In reality, the only acceptable leak rate for hazardous or poisonous substances is zero.
Certain types of leaks do not occur until the system is stressed by the application of near-operational pressure. Where possible, HLD should be performed at 95% of the system relief valve setting as this simulates operational system pressures. This allows for identification of leaks that may be undetectable at lower pressures.

**Engineering and Preparation**

The production of detailed procedures, as part of the engineering and preparation phase of a project, is essential to ensure the safe and efficient execution of the subsequent operations. During the engineering phase, the process system will be split into individual “test packs.” Normally, this will be where a specification change is found in the system. Each test pack is color coded to aid identification. Halliburton preparation and planning ensures that all joints and components within the system are subject to the helium leak test and that depressurization routes are specified. Any leaks found are assigned an individual alphanumeric identification.

**Pressurization**

A helium leak test will generally be performed at 95% of the system relief valve setting. Calibrated instrumentation is connected to the system to monitor system pressurization. Halliburton’s Over Pressurization Skid helps assure that specified test pressure cannot be exceeded.

**Leak Detection**

Each connection within a process systems test pack is sealed with PVC tape. Leak detection is performed by sampling the atmosphere contained within the PVC envelope. A calibrated helium mass spectrometer analyzes the sampled gases, and the concentration of helium detected is used to calculate the rate of any detected leak. Any leakage detected is recorded on both Halliburton’s Leak Detection Reporting package and also on the relevant highlighted system Piping and Instrumentation Diagrams. Leaks that are above the specified acceptable level are repaired and retested to confirm their integrity.

Under no circumstances are repair/remedial actions carried out while the system is pressurized. Project information is collated to form the basis of the client’s End of Job Report.

**Video Inspection Services**

Halliburton Pipeline and Process Services has recently added video inspection to its range of services. Video inspection enables both static and motion video images to be gathered from internal pipelines (2-in. to 48-in. internal diameter), process equipment and rotating machinery. These images facilitate detailed internal inspection of equipment without the necessity of disassembly and subsequent assembly, reducing down time and cost. Additionally, using video inspection for locating faults or inefficiencies in equipment will assist in the development of your remediation strategy. Video inspection complements Pipeline and Process Services’ hydrocarbon decontamination capabilities and brings the goal of ‘zero manned entry operations’ a step closer.

For more information about Halliburton’s Helium Leak Detection service, visit www.Halliburton.com, contact your local Halliburton representative or e-mail pps@Halliburton.com.