

# Helium Recovery and Recycling Systems

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***While industries strive to meet increasing demands to offer higher quality products at lower prices, the need to efficiently recover and recycle process gas becomes apparent.***

Helium has unique properties that make it valuable for use in a wide range of applications. Its properties make fine leak detection possible, which has led to the adoption of helium usage in mass spectrometry helium leak detection technology, enabling many companies such as OEMs, tier one automotive part manufacturers, etc. to produce quality product while remaining competitive.

## **Why Recover/Recycle Helium?**

Helium is not an infinite resource, however. Because of a delicate balance between helium availability and increasing demand, it is essential that the helium-producing industry work with helium end users to conserve, recover and recycle this valuable resource. Products for recovering, storage and recycling helium developed by V.I.C. offer manufacturers an opportunity to significantly reduce their production costs.

“Helium prices are expected to rise,” according to *Chuck Wilkinson, Corp. Director of Marketing for Vacuum Instrument Corporation*, world’s largest independent manufacturer of leak detection equipment and leak-test systems, “but industrial users may be even more concerned about spot shortages that can delay their own production lines. This is a good time,” he added, “for industrial helium-users to look carefully at the cost/benefit ratio that V.I.C. can deliver with our proven gas recovery and recycling systems.”

V.I.C.’s Helium Recovery product line features a group of high efficiency gas

recycling systems that significantly reduce operating costs associated with Helium leak testing. “Our wide choice of standard models and custom manufactured products provides the flexibility to quickly meet varying capacity requirements while reducing tracer gas operating costs.”

## **Assessing Helium Recovery Options**

Helium Recovery features a group of high efficiency gas recycling systems that significantly reduce tracer gas operating costs. The decision to invest in a Helium Recovery system is often determined by its financial feasibility.

Here is a sample calculation to assist in determining if the system can be justified. Application: Helium leak test of A/C components

- Internal volume of product: 100 in<sup>3</sup>
- Production rate: 500/hr
- Tracer gas test pressure: 200 psig

In this sample application, the helium gas usage is 393.7 CFH. If we assume two shifts per day the helium consumption is 6,300 cubic feet. If the cost of bulk helium is at \$10/100 cubic feet, then the daily cost of helium is \$630. At these levels the equipment purchase price is recovered in less than two years.

## **How It Works**

Gas Recovery Systems offered consists of ASME coded pressure tanks, a set of compressor(s), gas analyzer, microprocessor controls and all necessary valving, gas regulation and piping. The gas recovery operation includes these major steps:

1. The tracer gas in the product is vented into the vacuum surge tank (T1).
2. During each stage of compression the tracer gas is passed through a set of high efficiency water cooled heat exchangers to remove the heat generated during compression.
3. The final compressor outputs to tank (T3) completing the recycling operation.

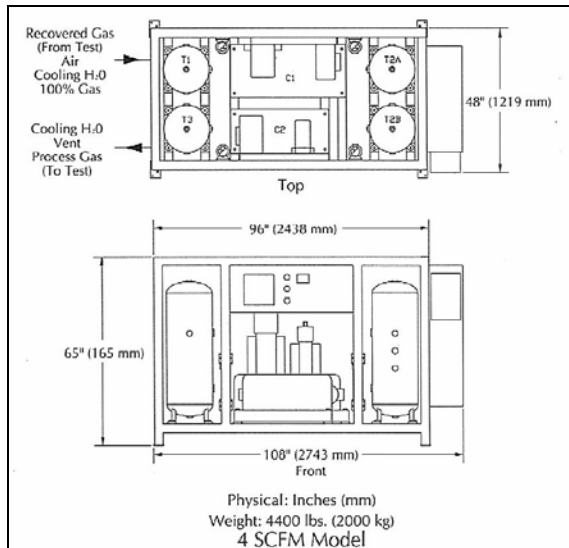


Fig.1

### A typical V.I.C. Helium Recovery System is pictured in Fig.1

#### Item/Description

1. Compressor skid
2. Main gas control panel
3. ASME coded pressure storage tanks
4. Operating control and console
5. High efficiency water cooled heat exchangers
6. All stainless steel interconnecting manifolding
7. High conductance pneumatically actuated ball valves
8. Thermocouple for monitoring temperature in critical areas
9. Built-in gas analyzer
10. Calibration standard

### Why Use Helium?

-Helium is present in the atmosphere at around five parts per million which results

in lower instrument background and therefore better test sensitivity.

- It's inert. The only danger when using helium is simple asphyxiation but only when used without adequate ventilation.
- It's light. Helium will dissipate quickly allowing fast cleanups of the mass spec and ultimately shorter test times.

### Who Uses Helium Leak Detectors?

Helium leak detection is one of the most widely used methods of nondestructive testing in use today. Current applications span a diverse field of products and industry. Bio-tech companies use helium leak detectors to test implantable medical devices such as pacemakers to insure that the outer packages are protected from bodily fluids and to protect patients from possible contamination from leaking batteries and other materials. Automobile manufacturers use helium leak detection technology to test items such as air bag initiators, radiators and air conditioning units. Semiconductor fab's widely employ leak detectors to leak test process equipment.

### Why Use V.I.C. Recovery Systems?

V.I.C. Gas Recovery Systems offer:

- Recovery efficiencies up to 98%
- Standalone programmable control packages
- Compressors utilizing an oil-less piston seal prevents oil contamination of the test object
- ASME coded and certified gas storage vessels
- Continuous on-line gas concentration monitoring/feedback ensures proper tracer gas levels
- Real time diagnostics
- Automatic start-up operation, as well as a host of other design features to boost reliability
- Non-Lubricated cylinder and piston offer for ease of maintenance.
- Cushioned valves designed for long life and quiet operation.

- Piston rod seals of glass-filled self-lubricating Teflon, spring-loaded to compensate for lateral rod movement, wear and temperature variations.
- Crankcases totally enclosed with an automatic breather valve to prevent entrance of dust or foreign matter.

Single-sourcing can be crucial to the efficiency, reliability and support for your manufacturing operations. In order to provide complete peace of mind, V.I.C. offers truly complete leak-test solutions from product preparation to gas recycling including gas chargers, mixers, boosters and everything else that you may need to make your production line as efficient as possible.

V.I.C. offers complete solutions from product preparation to gas recycling, including Smart Charge™ — an advanced gas backfill and evacuation system, gas boosters, gas mixers and gas recovery systems.

Behind VIC's quality cost-saving products is a first class customer service organization. V.I.C. provides complete turnkey leak test systems — something no other U.S.-based helium mass spectrometer manufacturer can offer. Their staff of application specialists can assist in determining product leak rate specifications, gas handling requirements and equipment recommendations.



Fig. 2, V.I.C. 24 SCFM Helium Recovery System



Fig. 3, V.I.C. 4 SCFM Helium Recovery System

### Conclusion

Helium recovery and recycling make sense. With the ever increasing costs of helium, the economics of installing recycle systems become increasingly attractive. Many factors need to be taken into account in deciding the most effective helium recycle solution for a given situation. The economics of recycling improve with increased volume use. Helium users need to be aware that using a helium recycle unit can not only lower costs and protect an important resource, but can also open the door to other applications and opportunities.

### About Vacuum Instrument Corporation and VIC Leak Detection

Vacuum Instrument Corporation (V.I.C.) is the world's largest company devoted solely to research and design, manufacture, distribution, training and service of leak detectors and complete leak detector solutions. In 2000, Vacuum Instrument Corporation acquired the Leak Detection Division of *Veeco Instruments Inc.* This division was reorganized as the Advanced Leak Metrology Division. V.I.C.'s Industrial Leak Detection, Air Leak Testing, and Advanced Leak Metrology Divisions combine their engineering, manufacturing, and marketing resources as *V.I.C. Leak Detection*.

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