

Varian, Inc.
Vacuum Technologies



Leak Detection of Automotive Components

Helium
Leak Detection



Acoustic



Bubble Testing



Pressure Decay



Halogen Sniffer



Inspiring Excellence



VARIAN

Leak Detection of Automotive Components

Today's Demanding Requirements

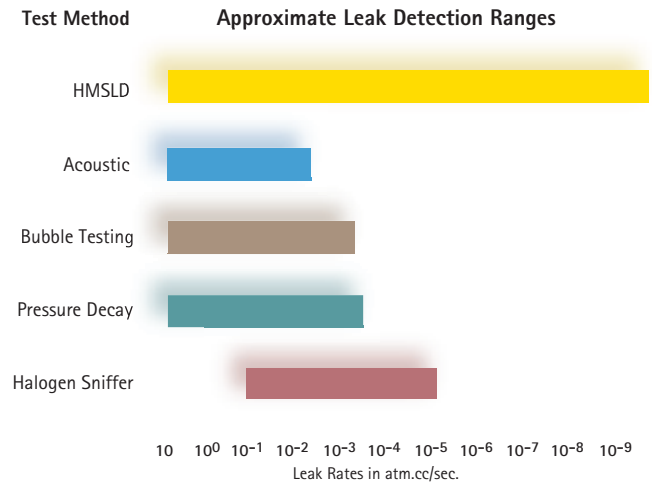
More stringent leak test requirements are forcing manufacturers of automotive products to introduce more sophisticated leak detection technologies. Widely used test methods such as pressure decay and bubble testing technology are insufficient, unreliable, and very slow processes.

In contrast, Helium Mass Spectrometer Leak Detection (HMSLD) enhances sensitivity and productivity and also allows precise measurement to NIST traceable standards. HMSLD uses helium as the tracer gas, which is:

- Non-toxic
- Non-flammable
- Environmentally friendly

As the table on the right shows, HMSLD:

- Is a clean, dry test method
- Provides 100 times greater sensitivity
- Can be used to locate and/or measure leaks
- Is not temperature dependent



Wheels

Typical parts	Wheel rims
Leak specification	1 psi/30 days or 1 atm/yr
Helium equivalent	3×10^{-4} atm cc/sec at 40 psi (3 atm) delta P



Air Conditioning Components

Typical parts	Compressors, condensers, evaporators, accumulators, transfer lines
Leak specification	0.1 oz (2.8 grams)/year
Helium equivalent	1.8×10^{-5} atm cc/sec



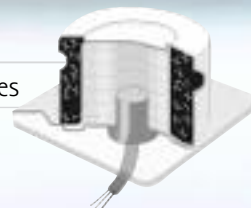
Engine Cooling Components

Typical parts	Radiators, Heater core, oil and transmission coolers
Leak specification	Bubble test, pressure decay.
Helium equivalent	10^{-3} , 10^{-4} atm cc/sec



Air Bag Inflation Modules

Typical parts	Air bag inflation modules
Leak specification	10^{-6} to 10^{-8} atm cc/sec helium

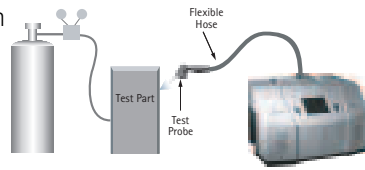


Locating and Measuring Leaks

Various leak detectors may be employed in any of several ways to find or measure leaks.

Locating Leaks

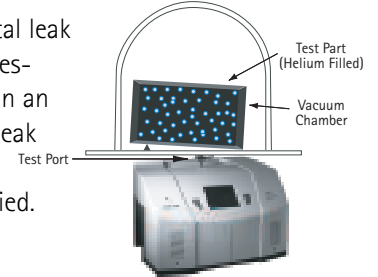
The most common method used with parts that are pressurized is to scan them with a Sniffer Probe attached to the inlet of the leak detector, paying special attention to areas prone to leaks, such as welds, seams, seals or feedthroughs. When a leak is encountered, helium is captured through the probe and detected by the sensor. Leak sites are identified quickly thanks to fast response time.



Locating leaks using Sniffer Probe

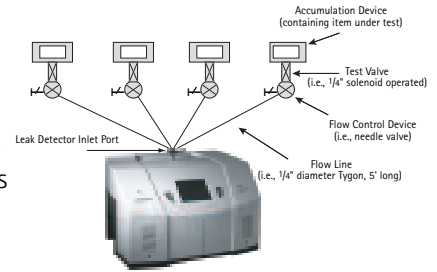
Measuring Leaks

When it is necessary to quantify the total leak rate of potential leak sites, parts are pressurized with helium, and enclosed within an envelope connected to the inlet of the leak detector. In this configuration, helium can be effectively collected and quantified.



Measuring leaks in enclosure

The Accumulation Method is used to automate the sniffing process and uses fixturing to collect helium from leak sites. Fixtures that have multiple parts or potential leak sites can be isolated sequentially to locate leaks. Accumulation is advantageous, because it does not require evacuation of the outside of the part as depicted above and does not depend heavily on the operator's exact use of the sniffer probe.



Accumulation Method

Drive Train Components

Typical parts Torque converters, transfer cases, rear axles

Leak specification 0.5 to 3.0 cc/min at working pressure

Helium Equivalent 8×10^{-4} to 5×10^{-3} atm cc/sec

Fuel Delivery Systems

Typical parts Fuel rails and lines, fuel injectors, sender units

Leak specification	LEV II	PZEV
Helium equivalent	10 ⁻³ (liquid)	10 ⁻⁴ (liquid)
	10 ⁻⁴ (vapor)	10 ⁻⁵ (vapor)



Fuel Storage Components

Typical parts Gas tanks, filler neck assemblies, carbon canisters, gas caps, rollover valves

Leak specification 15-20 micron hole at 2 psi (0.1 atm) pressure differential

Helium equivalent 10⁻³ (liquid) 10⁻⁴ (vapor) atm cc/sec

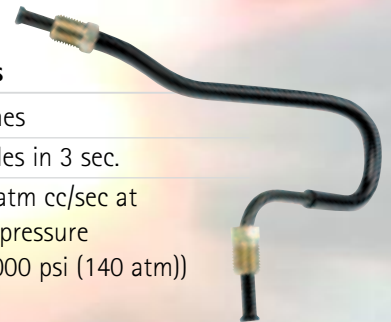


Brakes

Typical parts Brake Lines

Leak specification No bubbles in 3 sec.

Helium Equivalent 5×10^{-2} atm cc/sec at working pressure (up to 2000 psi (140 atm))



VARIAN'S HELIUM LEAK DETECTION TECHNOLOGIES

Varian has been in the forefront of helium leak detection for 30 years. Our helium leak detectors, manufactured in Lexington, Massachusetts are available in mobile or workstation units, as well as component models for integration into automated production lines. Varian leak detectors have been successfully used and integrated in the following automotive applications: fuel delivery, air conditioning, torque converters, brakes, wheels, air bags, headlights, electronic packages, gas tanks, heat exchangers, and many others.

To receive a copy of the Varian Leak Detection Catalog, contact us at 1-800-8VARIAN.



VARIAN'S EXPERIENCE AND SUPPORT

Varian has the most extensive and experienced team of Field Sales and Applications Engineers available today to understand your application requirements. Our worldwide service and engineering team helps you determine the best system solution to perform to your production requirements. Your solution is backed by our award-winning service and technical support. And to guarantee optimal performance, Varian offers industry-leading training on leak detection, maintenance and vacuum practice.

To speak with a Varian leak detection expert, please contact us at 1-800-8VARIAN.



LET US HELP YOU ACHIEVE YOUR GOAL

Our success is achieved when you reach your goal. Whether it is to reduce your cycle time, improve your production yield, or meet your regulatory or certification requirements, Varian can provide the guidance, equipment and support that you need.

To receive a catalog of our full complement of products and services, contact us at 1-800-8VARIAN or by e-mail at vtl.customer.service@varianinc.com.

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