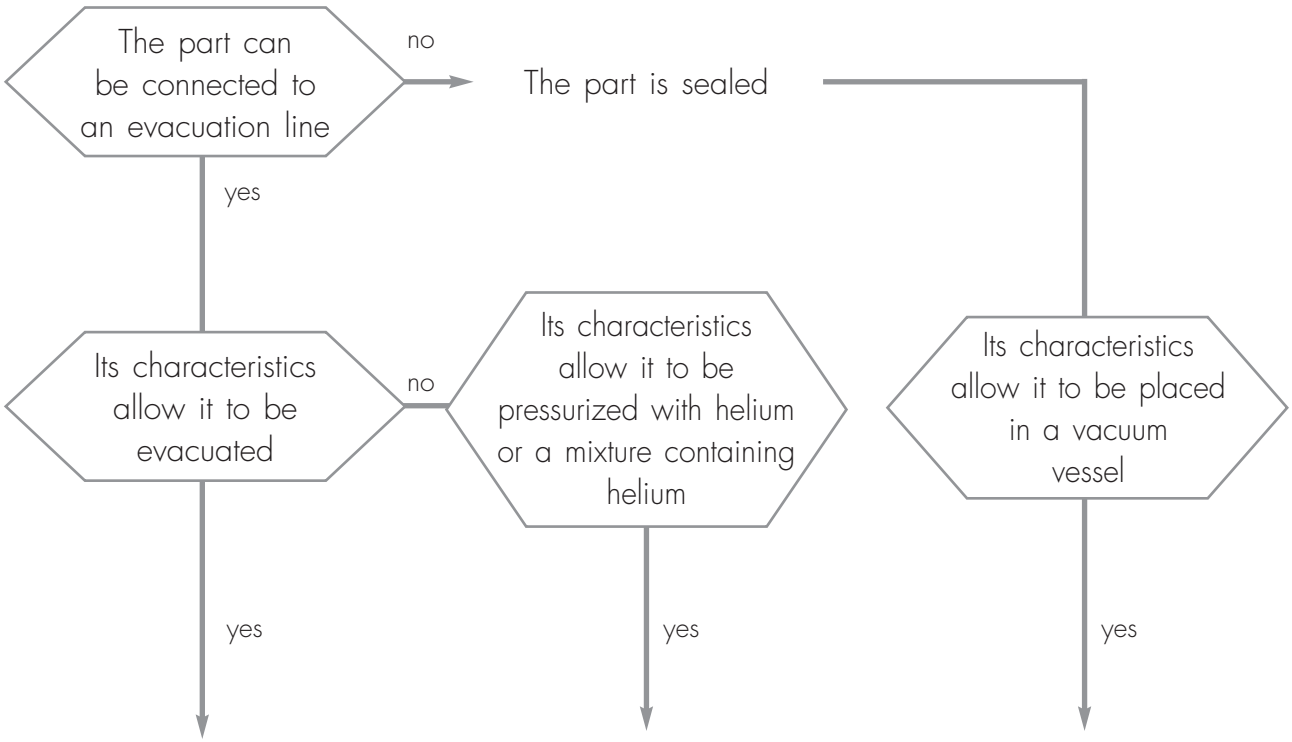
Testing methods

Overview

Leak detection is used to detect micro-openings, porosities, etc. in test parts. The detection of these cracks involves the use of a light tracer gas, which is capable of infiltrating the smallest leak quickly: **Helium**.

The detector samples and measures the helium flow rate entering the test part via the leak(s).

The testing method is selected according to the test part and the measurement accuracy required:



Leak rate measurement from 10^{-10} to 10^{-1} mbar. l/s and possibility of locating the leak.

Minimum detectable leak of 10^{-6} mbar.l/s and possibility of locating the leak.

The sensitivity is limited by the internal dead volume of the part as well as on the bombing time and the pressurization value.
Global test without possible location of the leak.

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Helium concentration and signal displayed

In accordance to the He concentration rate in the gas used for the leak detection, the signal displayed will change.

Example: signal displayed with a $1x10^{-7}$ mbar.l/s calibrated leak (with 100 % He) connected to the detector inlet.

	% He in the gas used		
	100 %	10 %	1 %
Signal displayed on the leak detector	$1x10^{-7}$ mbar.l/s	$1x10^{-8}$ mbar.l/s	$1x10^{-9}$ mbar.l/s

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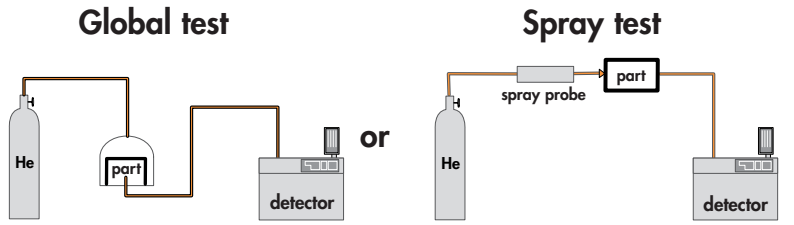
Spray method (inboard testing)

This involves removing air from the test part, connecting it to the analyzer and then spraying helium over the outer surface.



The part is placed under a cover, into which helium is injected.

Potential leaking areas are sprayed with helium.

The leak cannot be located.

The leak can be located.

The detector measures the flow of helium penetrating the part.

Response time

When spraying starts, the leak signal is not displayed instantaneously on the analyzer:
there is a response time which depends on the volume V being tested and the helium pumping speed S of the system at the opening of the part, according to the following relation:

$$T = \frac{V}{S}$$ (T in seconds, V in litres, S in l/s)

T is the time required for the signal to reach 63 % of the final value.

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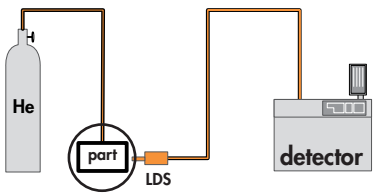
Sniffer method (outboard testing)

The test part is pressurized with helium. The detector, via an LDS (Long Distance Sniffer) probe, samples the helium escaping from the part.

Global test



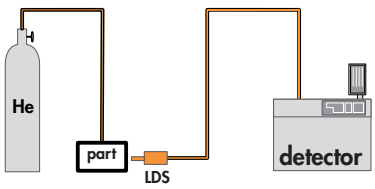
The part is placed under a cover containing a sniffer probe.

The leak cannot be located.

The helium from the leak accumulates over time inside the cover. The detector measures the concentration of helium.

or

Local sniffing test



The sniffer probe is moved over areas likely to contain leaks.

The leak can be located.

The signal supplied by the analyzer is not a direct measurement of the leak. The sniffer probe only samples part of the helium escaping from the part. The sample depends on the distance separating the leak from the tip of the probe.

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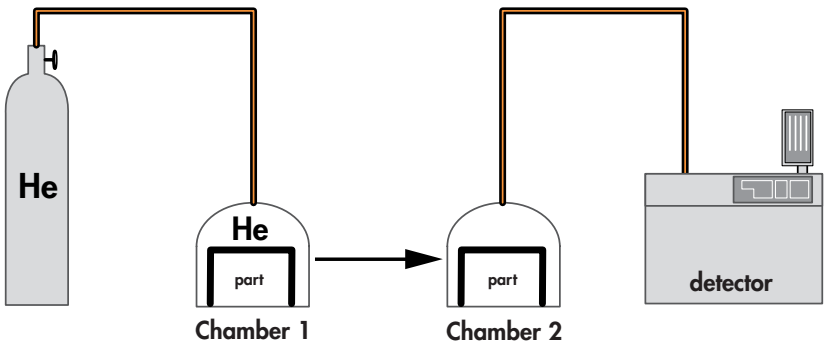
Bombing method

This method is used for sealed objects that cannot be connected directly to the detector (semiconductors, waterproof watches, etc.).



The part is placed in a chamber containing pressurized helium.

The helium penetrates the part if it has a leak.

The part is then removed from the chamber and placed in another vacuum chamber which is connected to the detector. The helium escapes from the part through the leak and produces a signal.

This signal is not a direct measurement of the leak as the helium pressure inside the part is difficult to determine. Several parts play an important part such as: the pressurization time, the helium bombing pressure, the internal volume, the aeration time, the size of the leak.

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