LACO TECHNOLOGIES

APPLICATION NOTE

NOTE #13-11

SIMULATED LEAK BUILT INTO PARTS

SCOPE

This application note addresses the use of leak standards to simulated leaks in production parts.

BACKGROUND

In leak testing of any kind, it is necessary to regularly verify the leak test system to ensure its proper operation. A convenient way to accomplish this is to run a known "bad part" through the process and note the result. A leak standard with a known leak rate can be built into a part, or take the place of a part, to be used in this verification process.

DESCRIPTION

There are several varieties of leak testing applications in which a leak standard can simulate a part being tested. Different types of leak standards are available for the various leak testing scenarios. These include chamber leaks, in-line leaks, and bombing leaks. In each case, the leak standard may replace the part entirely, or be built into the part. Usually, the leak rate of the simulation leak standard is at or slightly greater than the part leak reject limit.

Chamber leak

If a part is freely placed inside a chamber in which it will be monitored for leaks, a leak standard can be used in place of the part to verify system integrity. Such a leak standard must fit inside the chamber without compromising the chamber seal(s), and must be known to have no "external" leaks (meaning there are no leak paths from the built-in gas reservoir other than through the calibrated leak element). Other considerations should also be made, depending on the method utilized. For example, a helium leak standard used in hard-vacuum leak testing may need to be refilled frequently with helium, or the physical volume occupied by a leak standard used in pressure decay chamber testing should match that of the part.

In-line leak

A leak detection system may supply a tracer gas to a part during the leak test process by means of a gas line that is connected to the part or by flooding the outside of the part with the gas. In some cases, such as the vacuum decay method, the atmosphere may be the gas source. A leak standard may replace the part for validation purposes. It is always critical that the connection between the leak standard and the system be leak-tight, and some means of providing confidence in the integrity of the connection should be considered. The purity of the gas may influence the result of the test, so it is important that the gas line be purged of all other gases prior to introducing the test gas into it. In some cases, the physical size of the leak standard may affect test results and should closely match that of the part; in others, size and shape may be issues of practicality.

DESCRIPTION (CONTINUED)

Bombing leak

In applications where a part is "bombed" with a tracer gas and then monitored for leakage, a simulation leak standard should be constructed such that its internal volume is the same as that of the part. Because bombing leaks manifest themselves differently based on bombing pressure, bombing time, dwell time, and test time, an appropriate pressure/leak rate combination should be considered for the calibration of the leak standard. Ideally, the leak standard should produce the reject leak rate when subjected to the same bombing process that is used for the part.

In selecting a leak standard, the following guidelines should be followed:

- The leak rate of the standard should match or be close to the test reject leak rate.
- The leak standard should contain and/or be calibrated with the same gas as the test process, and in the case of open-style (in-line) leaks, be calibrated with the same gas pressure that is used in the test process.
- Gas inlet and/or outlet connections, where applicable, should be the same as the test part; or, if the leak will be built into a part, a leak-tight means of connecting it to the part should be specified.
- Size restrictions and configuration details should be carefully determined and specified.

BENEFITS

Using a leak standard to simulate a part allows is highly beneficial to validate a leak testing process. The process and setup do not need to change to perform validation testing, saving significant time, cost and effort. Important details of the system, such as sensitivity and response time, can be determined or verified using a known leak standard to simulate a part.

RELATED PRODUCTS

LACO Technologies offers leak standards for a wide range of applications in standard or custom configurations:

- Gas Sniffer calibration (including refrigerants)
- Mass Spectrometer calibration
- RGA calibration
- Vacuum decay testing
- Pressure decay testing

REFERENCES

- CalMaster™ Leak Standard Manual
- Application Note 01-06: Helium Leak Testing of Sealed Parts (Bombing)