LACO TECHNOLOGIES

APPLICATION NOTE

NOTE #01-03

HELIUM LEAK TESTING FLEXIBLE WALL PARTS

SCOPE

This application note covers production leak testing of products, typically constructed of plastic and/or plastic films that do not have a rigid form or walls such as single use bags.

BACKGROUND

Products with flexible walls typically can only withstand mild vacuum and low pressure, and often have high helium permeation which introduces additional challenges when leak testing. Examples may include: automobile fuel tanks, 55 gallon drums, plastic storage containers, plastic film bags for chemicals and non-liquids, as well as single use bags used in the pharmaceutical industry.

Single use bags have gained popularity because they can reduce design expenses, initial capital outlay, validation services, ongoing energy, and operational costs, as well as maintenance expenses. However, fears over leaks contaminating a large batch of expensive product continue to be a concern. Leaks not only cause product loss from the container, they can also be a source of chemicals or organics that degrade and contaminate the bag's contents.

The test method employed for testing flexible wall products must be capable of detecting the desired leak, but without damaging the part or be affected by potential changing volume of the part during the test. Both pressure decay and helium leak testing methods may be employed when leak testing. Refer to Application Note 01-04: Helium Leak Testing of Helium Permeable Parts for additional information.

DESCRIPTION

Pressure Decay Leak Testing

Pressure decay leak testing depends on detecting small changes in system pressure that are correlated to a leak defect. The test part is charged with air, allowed to stabilize, and then its internal pressure is monitored for a drop in test pressure that correlates to a leak. Testing with minimal volume is desired to attain the highest sensitivity. Test parts that are flexible enough, such as a plastic film storage bag, can sometimes be folded or otherwise constrained to reduce test volume which reduces cycle time. However, care should be taken not to mask leaks in the folded or constrained areas, nor damage the part due to stresses. Another consideration is to prevent the part from moving during the test and changing its volume. Some flexible parts are elastic in nature which can cause significant volume changes resulting in leak testing non-repeatability. Finally, care should be taken not to stress the part with too high of a pressure to the point that it fails or its properties are permanently affected

Helium Leak Testing

Traditional hard vacuum leak testing is often difficult to perform on flexible wall parts. The pressures resulting from a full vacuum can damage the part. However, specialized pumping techniques can be used to reduce the stress on the test part, by reducing the internal pressure of the part along with the external (chamber) pressure to minimize the stress and allow for a leak test.

DESCRIPTION (CONTINUED)

Alternatively, LACO has developed the HATS™ (Hybrid Accumulation Test Method, U.S. Pat. No. 7,905,132) leak test method which allows for fine leak testing of parts using a helium mass spectrometer leak detector without the need for a full vacuum. This method can often achieve desired results at lower part differential test pressures and with faster cycle times compared to traditional helium accumulation methods.

SUMMARY

Specialized testing methods can be employed for both pressure decay and helium leak testing applications to successfully test flexible wall parts.

RELATED PRODUCTS

LACO Technologies engineers custom equipment to implement all of the above leak test methods, including:

- Turn-key, automated hard vacuum leak testing systems including the fabrication of leak test vacuum chambers.
- Turn-key, automated helium accumulation systems and HATS™ (U.S. Pat. No. 7,905,132) test systems.
- Turn-key, automated pressure decay air leak test systems

REFERENCES

- Application Note 01-04 Helium Leak Testing of Helium Permeable Parts
- ASTM F2095-07, “Standard Test Methods for Pressure Decay Leak Test for Flexible Packages