Sealed Enclosure Integrity Testing Trends: IP67 and IP68

Enclosures are trending toward requirements for stricter ingress protection against dust and liquids, which is especially relevant to IP67 and IP68 ratings for products in consumer electronics, military and automotive sectors. Whether it is the next generation of smart phones and smart watches or on-vehicle cameras and new technology for the front line in military and industrial sectors, more devices compete on the ability to withstand dirt and water.

**IP67** is a rating that is dust proof and requires no leak for 30 minutes within 1 meter of water immersion.

**IP68** is dust proof and requires no leak for 30 minutes beyond 5 meters of water immersion.

Now is the time to future-proof your enclosure leak testing process with InterTech machines and M1075 instruments.

**Typical consumer, military and industrial applications include**

- Consumer cell phones
- Underwater cameras
- Rear view backup cameras
- Military electronics
- Automotive tire pressure sensors
- Consumer watches

For non-medical devices, the primary alternatives for enclosure testing are mass flow and pressure decay methods.

**The Case for Mass Flow Leak Testing of Rigid Enclosures**

Mass flow leak testing with the InterTech M1075 is non-destructive, clean and easily handles specifications of 0.5 sccm at bar pressure of 0.2 to 0.3 with fast test times. Because it senses change in air pressure for gross leak and senses change in air volume for final leak test, this method is effective for rigid enclosures with multiple voids or compartments.

InterTech M1075 instruments quickly and easily handle 0.5 sccm at pressure of 0.2 to 0.3 bar.

Patented InterTech instruments automatically compensate for external changes such as temperature, and a unique test-centric design assures gage accuracy. The InterTech value proposition of mass flow leak testing is totally reliable test results with speed and accuracy. InterTech guarantees higher throughput per machine, which reduces capital expenditure for 100-percent in-line testing in mass production.

A method used to detect leakage in sealed enclosures is shown in **Figure 1**. The test part is placed in a chamber and the chamber and reservoir are pressurized to test pressure then isolated from the pressurizing source. If the test part leaks, the pressure inside the chamber will force air into the part. Since the reservoir remains at test pressure, air will flow from the reservoir into the chamber to maintain equilibrium. The mass flow transducer reading will be directly proportional to the leakage.

Gross leak detection is accomplished by controlling the volume of air used to charge the chamber and reservoir and monitoring the final pressure. Failure to achieve test pressure in a specific time indicates a gross leak.
Pressure Decay Leak Testing

Pressure decay leak testing systems are fundamentally slower and less accurate than mass flow testing. Test speeds lag behind mass flow because pressure decay is a two-step process, and pressure decay is less accurate than mass flow because it is prone to interference.

As a two-step process, it is especially sensitive to fluctuations in external factors such as vibration, ambient temperature and barometric pressure so results with pressure decay can vary from hour to hour. Even under ideal conditions, it takes more pressure decay machines to achieve the same throughput as mass flow systems.

Leak Testing for Medical and Food Packaging

Linear Variable Differential Transformer (LVDT) displacement sensors and force sensors may be used to test packages for medical products. Applications include:

- Blister packs
- Devices in pouches
- Food containers and portion packs

Although LVDT displacement sensors provide accurate measurement of dimensional changes, there is no correlation to leakage rates. Basically, an enclosure is placed in a pressure chamber with a particular area of the enclosure contacted by the sensor. During the test, dimensional changes caused by pressure (whether positive or a vacuum) is used for an indirect measurement of leakage.

Lasers are an alternative to LVDT, but once again, the problem is that package dimensional change does not correlate to leakage rates.

New Force Deviation Analysis Technology for Non-rigid Packaging

A better, more economical alternative for non-rigid packaging is force deviation analysis which compares data for representative good and bad parts so a go/no go evaluation can be made to accept or reject a test part.

Figure 2 is a representation of vacuum-force deviation analysis. The test part is constrained between two plates under a consistent preload. The vacuum valve is opened. The vacuum pump and vacuum accumulator evacuate the test chamber to a preset stabilized vacuum level quickly and accurately. The vacuum level and the force exerted by the expanding gases in the test package are measured by sensors and compared to standard criteria for the product.

Vacuum Force Deviation Analysis

Save Money and Time on Sealed Package Test Systems

New technology and professional guidance from InterTech Development Company ensures you save money and time with sealed package test systems even if specified to IP67 and IP68 guidelines. New electronic wearables, phones and cameras are just some of the products affected by this trend. Whatever the future holds for leak testing of sealed packages, new and improved technology from InterTech is ready.

For a consultation and information about an application study, visit the InterTech website (www.intertechdevelopment.com) or contact their Skokie, Illinois USA world headquarters at 847-679-3377.