

Inspect Sealing Capability of Flexible Package Bags Using LSSD

Abstract: It is applicable in the measurement of heat seal strength, the quality of heat seal, the burst pressure and the seal-leakage character of each heat seal edges of the flexible packages that are made using various kinds of heat seal technics; the measurements of leak characters for all kinds of plastic pilferproof closures; the measurements of the unitary airproof character, compression resistance strength, cap body joint strength, cap disengaging strength, seal strength of edge, butting strength of various flexible tubes; Simultaneous, it can also provide evaluating and analysing for the compression and burst resistance strength of the materials of flexible packaging bags, the torsional airproof index of cap, the cap joint and disengaging strength, the stress strength; as well as the airproof character, the compression resistance character, the burst resistance character of unitary bottle, and so on

Key Words: flexible package, heat seal, open package, closed package, leak

LSSD(Leak and Seal Strength Detector is a new instruments presented by labthink) which is based on positive pressure method, can inspect the whole and local seal-leakage character of flexible packages such as caps, containers, flexible tubes and so on. It is the most widely used sealability testing instrument with the most complete testing index at present and can accomplish special testing items of flexible packages such as open packages and closed packages with testing accessory.

1. Summarize of Sealability Test

The most important property of packages is its sealability, the barrier property of package materials will failure and its contents will metamorphic as gases and liquids penetrate into and from packages through leak point. But indexes related to seal ability of each packaging style are different. For example, as to flexible packages made by heat seal technology, heat sealing edge is the position most likely to leak, sealing strength is the most important factor relevant to sealability of packages, so we need to inspect heat seal strength, the quality of heat seal, the burst pressure and the seal-leakage character of each heat seal edges of the flexible packages. But as to pileproof closure, we need to inspect sealability of cap, the torsional airproof index of cap, the cap joint and disengaging strength. These indexes will provide data to analysis leak instance for designers and manufacturers of packages.

For heat seal packages, high temperature in heat seal operation may affect mechanical strength of packaging material nearby, so materials nearby the heat seal edges are the weaknesses of flexible packaging sealability. When imposing pressures on flexible packages, pressures holding by different parts of packages are not even, but the places first appear to leak are the places holding lowest pressure, so we must test products of packages if we want to evaluate sealability of flexible packages accurately.

2. Introduction of LSSD

2.1 Advantages of LSSD Test

The method of testing general sealability of flexible packages is to increase pressures inside packages, so we need to create pressure difference between inner and outer of packages to simulate the real pressure states when inspecting sealability of flexible packages. There are two ways to implement it, positive pressure method(puff air into the packages to increase the pressure inside packages) and negative pressure method(vacuumize air to reduce the pressure outside packages). But in practical use, unlike positive

pressure method, negative pressure method has some limitations in opening packages test. LSSD combined various leakage test technologies on the basis of positive pressure test technology and expanded the objects of test from flexible packaging bags to containers, caps, flexible tubes etc. It specified the position of test, for example, to test the seal property of heat seal edges by restraining plate and test opening packages using opening package testing instrument.

2.2 Introduction of LSSD test

There are three ways to test flexible package bags using LSSD. They can be applied to evaluate the sealability of flexible package bags at each step of packaging.

Burst Test: puffing air into packages to increase pressure inside packages until bags burst. This testing method can test the maximum bursting pressure of specimen.

Creep Test: keeping pressures inside packages for a period of time. Specimen that do not leak during the test, is classified as “passed”, or is classified as “not passed”.

Creep to Failure: increase pressures inside flexible package bags to a specified pressure and keep it until the bags leak. The pressure is higher compared to creep test, to ensure that package is broken within a reasonable period of time. This test get the interval times of packages can endure the pressure until leak.

LSSD achieve the pressure difference between inside and outside of packages by probes that penetrated into the

package bags. It is easy to operate and clear in principles, the concrete steps of test is as follow:

First: select the testing method according to the standard executed.

Second: prepare specimen and adjust the height of probe to ensure the pressure's increasing and expanding.

Third: put the specimen into the testing instrument and be caution of the sealing of position that probe inserts into.

Fourth: turn on the testing instrument. Then select test mode and set parameters according to objects and relevant standards. Starting test and puffing air into flexible package bags to increase pressure.

Fifth: inspecting test result. Inspect the bursting pressure and bursting time or judging whether the specimen is “passed” or not according to the testing method selected.

There are many factors that affect the result of seal-leakage test. For example, the dimension and material of package, the speed of pressure increasing inside package, sensitivity of sensor and the testing method. We should keep the consistency of testing conditions according to the aspects above if we want to compare the resulting data.

2.3 The Application of Restraining Plates

In daily lives, there are various kinds of flexible package bags, but they are mainly used in independent packages of foods, medicines, cosmetics, even daily chemical industry and electric component. These flexible package bags do not only form a closed environment but also need to be protected by puffing air into it. The air puffing into easy broken packages has a effect of buffering, except in modified atmosphere packaging of foods and medicines. The status of pressures imposing on flexible package bags is not the same as free expanding because of piling up and storing of package bags in transportation and storage. Pressure would concentrate on heat seal edges where burst is most likely to occur. In order to simulate the concrete application environment, specially designed restraining plates testing method is applicable. Labthink LSSD-01 leak and seal strength detector provided corresponding testing accessories and LSSD-01R restraining plates.

Bursting is likely to appear at the edges of heat seal and surface of flexible package bags where are of the worst sealability of flexible package bags including materials of flexible package bags. Accurate and quantitative

restricts that will be made to expansion and distortion of flexible package bags by using restraining plates, concentrating and distributing pressures at the edge of heat seal. So the application of restraining plates would test the sealability of flexible package bags directly and have great practicability.

2.4 Open Package and Closed Package

There are various kinds of flexible package bags, but there are basically two classes, open package and closed package. Generally, flexible packages that are thoroughly sealed and can stand stresses at the edges of heat seal, like middle-sealed bags, four-edge sealed bags, stand bags, belong to closed package. A circular hole which would be sealed after the insertion of puffing probe, must be opened at the center of bags before test, then bags are available to test. The position of circular hole may affect the result of test and we suggest it to be opened at the center of specimen. three side seal bag, hand bag, shopping bag etc belong to the class of open package. We can only test the seal characters of three sides except unsealed side and materials with specially made accessories. For example, the LSSD-01P of labthink, the position of open package that pressure imposed on, is different from that of closed package. Of course, users can implement sealability test of heat seal edges of open package by using LSSD-01P and LSSD-01R.

3. Summary

We can test the sealability of various flexible packages more thoroughly and systematically and analyze the ultimate reason of bursting by using LSSD. Analyzing and improving the thickness of materials of heat seal layers, burst resistance strength of films and relevant heat seal indexes, or change heat seal materials and could combine other testing methods to evaluate the integrality of content of package, consistency of sealability of package and open character of content of package. The objects of LSSD test have expanded from flexible package bags to containers, caps, flexible tubes and so on and LSSD is applied more widely.