

Test of Package Develops with New Requirements

Abstract: Package testing is not unchangeable. Progressing of testing technology and appearing of new testing methods results from the changing of testing requirements. At present, domestic package testing has approached international advanced level and index testing that is helpful to technical improving cannot find reference standards, thus make developing and innovating of package testing an inevitable trend.

Key word: package testing, testing requirement, upgrading product, auto gas permeability, thermal viscosity and friction coefficient

The popularization of package testing results from people's raising attention to package function. To guarantee the protective function and other special functions of package, property testing of package material becomes a necessity. Package testing is not always the same, progressing of testing technology and testing methods are the main reasons for test developing.

1. Progressing of Test Technology

Based on technology advancement and testing experience, the improvement of package testing technology includes subdividing of testing objects, improving of instrument elements and testing methods. Its main purposes are to make instrument operation more safe and convenient, to improve testing accuracy and expand testing range. For example, the introducing of tensile testing instruments specially made for flexible package material has accelerated the designing and operating of corresponding testing accessories. In order to improving testing accuracy to an maximum extent, measuring range of this tester will be chosen completely in accordance with property of flexible package material. Under the help of professional operation analysis software, test operation becomes more convenient. For another example, among the series of Labthink heat-sealing testers, HST-H2 and HST-H3, with better property, are upgrading products of HST-H1 and have got favorable reception from customers.

2. The Appearing of New Test Methods

To some testing items, it is very common if more than three kinds of test methods appear simultaneously in the world. For example, test methods of material barrier property, whether its auto gas property testing or water vapor permeability testing, all exceed three kinds.

Taking material gas permeability testing as an example, its test methods can be divided into Differential-pressure method and Equal-pressure method. With a wide application, Differential-pressure method is applicable to all inorganic gases and can be further divided into vacuum method and volume method (ASTM D1434). Vacuum method can be used to test gas permeability coefficient, diffusion coefficient and solubility coefficient simultaneously. Along with the development of fuel cell oxygen analysis technique, fuel cell sensor is gradually adopted in the field of material oxygen permeability testing (sensor method of gas permeability testing). Different gas sensors can be used to test permeability of different gases. At present, testing technology of oxygen and carbon dioxide sensor method is already mature. In addition, although rarely used, chromatographic method can also be used to test gas permeability properties. Both sensor method and chromatographic method can be classified as equal pressure method. Gas permeability instruments that gradually appeared in sequence are of vacuum differential-pressure method, volume method and sensor method.

Although formulation of testing standards still features certain regionally, development of trade globalization makes the coexisting of various methods for material property testing. As to gas permeability testing, several test methods being offering simultaneously is a popular demand from customers. Though domestic auto gas permeability testing mainly uses Differential pressure method, equal pressure method also got an increase application due to the appearance of domestic test standards for equal pressure method in 2005. Being the biggest manufacture of domestic package testing instrument, Labthink has finished film gas permeability instrument manufacturing of all the test methods such as VAC-V1 based on vacuum differential pressure

method, BTY-B1 and BTY-B1P gas permeability tester based on positive pressure method, TOY-C1 and TOY-C2 package /film oxygen permeability tester based on Equal-pressure method. Labthink can provide barrier property testing of various methods, which can be chosen according to the requirements of customers.

3. Increase of Test Demand

The purpose of testing is to guarantee product quality and to maintain good operation of production line. As package technology is developing rapidly, the original small production line is not able to compare with present high-speed production line in terms of speed and output. Coiled material suitable for the past may not be suitable at present. Moreover, with its various functions, present package also surpassed past package. In view of these new phenomena, and new functions, testing items and testing methods should also advance with times.

In production line, inner content of package is usually filled by falling into package from certain height, which will cause intense impact to package bottom. If package bottom cannot endure such an impact, crazing of package will happen, which is a prominent phenomenon in high speed vertical Form-Fill-Seal Machine. Lower speed machine that is not thoroughly cooled also has such problem. If inner content is filled while the heat sealing part is not completely cooled, heat seal ability of the package at this moment is the hot tack of material, not the so called material ultimate strength (tested after heat seal part is cooled down completely) in traditional meaning. Technologically speaking, material hot tack, the intensity of which is much lower than that after being completely cooled, is the summation of sealing material's adhesivity within heat seal temperature range and bonding intensity of sealant to other component of multi-layer structure. With the increasing importance of material hot tack, heat seal tester manufactured specially for material heat seal ability testing is gradually appearing in the market of package material testing.

Meanwhile along with the speed acceleration of production line, unsuitability of friction coefficient between material and pull roller is one of the reasons for the breakdown of production line and the rising of rejection ratio. Therefore, friction coefficient of coiled material (especially the automatic coiled package material) must be performed before coming into production line. Fluctuation of environment temperature can also influence friction coefficient of material surface. In actual using, the heat cause by operation of production line will make temperature rising of instrument interior, surface and nearby space to some extent. Therefore, the influence of temperature on friction coefficient cannot be ignored. In the past, frictional behavior of material is only tested under room temperature (23°C) and the guiding value of test data to material is not significant. Friction coefficient of coiled material under actual application temperature should be tested. To carry out friction coefficient test in temperature rising environment, test instruments should preferably own self-temperature control function. In this way, not only test environment is stable, operation also becomes more convincing. For example, Labthink FPT-F1 can control the temperature within room temperature and 99.9°C. Though such temperature rising test has not got the support of corresponding standards, both the service condition and feedback of customer are very ideal.

4. Conclusion

Domestic Package industry starts rather later. Therefore property testing in the past is easy to obtain standard support and can borrow ideas from others directly. However, domestic package test has approached international advanced level. Moreover, the problems arisen in actual production and other index testing helpful to technology improving cannot find something to refer to. To meet these test requirements, developing and innovating of package testing is inevitable. Also, the drafting and revising of corresponding standards will be gradually improved after the maturing of test technology.