

Test of Package Develops with New Requirements

Abstract: At present, domestic package testing has approached international advanced level and index testing that is helpful to technical improvement cannot find reference standards, thus development and innovation of package testing a is inevitable.

Keywords: package testing , gas transmission rate , gas permeability , thermal viscosity , friction coefficient

The popularization of package testing results from people's raising attention to package functions. 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, progress of testing technology and testing methods are the main reasons for test development.

1. Progress in Test Technology

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

2. The Enrichment of New Test Methods

To some testing items, it is very common that more than three kinds of test methods exist simultaneously worldwide. For example, test methods of material barrier property, whether its gas property testing or water vapor permeability testing, all exceed the number.

Taking material gas permeability testing as an example, its test methods can be divided into Differential-pressure method and Equal-pressure method. Differential-pressure method is applicable to all inorganic gases with wide applications, 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 technologies of oxygen and carbon dioxide sensor method have been mature already. In addition, chromatographic method can also be used to test gas permeability properties though rarely used. Both sensor method and chromatographic method can be categorized 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 regionalism, development of trade globalization makes the coexistence of various methods for material property testing. As to gas permeability testing, the supply of several test methods simultaneously is an outstanding demand from customers recently. Though domestic gas permeability testing mainly uses differential pressure method, equal pressure method also got an increasing application due to the release of domestic test standards for equal pressure method in 2005. As the largest manufacturer of domestic package testing instrument, Labthink has realized 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. Increasing Test Demand

The purposes of testing are to guarantee product quality and to maintain good operation of production line. As package technology is developing rapidly, the previous small assembly line is comparable with present high-speed assembly line in terms of speed and output. Coiled material suitable for the past may not suitable for the present. Moreover, as to its various functions, present package also surpasses past package. In view of these new phenomena, new functions as well as testing items and testing methods should also advance with times.

In assembly lines, inner contents of packages are usually filled by falling into packages from certain heights, which will cause intense impact to package bottom. If package bottom cannot endure such an impact, cracking 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 down also has such problem. If inner content is filled while the heat sealing part is not completely cooled down, bearable heat sealability of the package at this moment is the hot tack of material, not the so called material ultimate strength (tested after heat seal part has cooled down completely in traditional understanding. Technologically, material hot tack, the intensity of which is much lower than that after being completely cooled down, is the summation of sealing material's adhesive strength 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 sealability testing has gradually appeared in the market of package material testing.

Meanwhile along with the speeded assembly line, unsuitability of friction coefficient between material and pull roller is one of the causes 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 assembly line. Fluctuation of environment temperature can also influence friction coefficient of material surface. In actual usage, the heat caused by operation of assembly line will make interior, surface and nearby temperature of instrument rise 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℃) 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 convincement. 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 customers are very ideal.

4. Conclusion

Domestic Package industry starts rather late. 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 references. To meet these test requirements, development and innovation of package testing is inevitable. Also, the drafting and revising of corresponding standards will gradually improve with the maturity of test technology.