

Transparent Package and Its Permeability

Abstract: In recent years, transparent package gradually becomes the trend of fashion. However, it is difficult for package to be transparent while at same time high in permeability. This article talks about why transparent package is becoming popular. Types and applications of high permeability material with high grade of transparency are also discussed in it.

Key words: transparent package, permeability, blister packaging, and high grade of transparency.

Package material with high grade of transparency has always been in pursuit of many packagers and consumers. It is undoubtedly that the basic methods of consumers in purchase are based on genuine material and solid substance as well as the real color of products. With the strengthening of package permeability, materials such as aluminum foil, aluminum plated material and paper molded aluminum are widely used in commercial package, by which the products has gained excellent protection and longer guarantee period. However, package transparency has been reduced. Transparent package now becomes the trend of fashion because it can simultaneously satisfy the requirements of being transparent while having high permeability.

1. Transparent Package

One of the principles in package design is adequate demonstration of commodity, which is mainly realized through two ways. The first one is reappearance of commodity with visual and colorful picture on package. The other way is the direct demonstration of commodity: using white transparent package or blank package. The most attractive thing of transparent package is its transparency. It can give consumer the opportunity of seeing the content clearly, which accords with the shopping habit that seeing is believing.

Transparent package has a widely application fields. Besides bottle and bag package, the following types of package are generally considered as belonging to the category of transparent package- single-sided transparent package with paperboard as underlayment and bubble cap, partial transparent package with blank, single-sided skin package and double sided clamshell blister package. Plastic and glass are the main material of transparent package.

According to the investigate report 'blister package and its high grade of transparency' from American Freedonia cooperation, food has the biggest requirement of high transparency package. This is because American consumers need that to have a direct look at the inner commodity so that they can know the freshness and sanitation of inner food. Medicine and medical treatment products has the second biggest requirement of transparent package with high grade of transparency.

2. Material of Transparent Package

Among the high polymer material used for package, transparent ones are not rare, such as PE, EVA, ionic polymer PP, PVC, OPS PT, PET, PA, PAN, PVDC, PVA, and EVOH. Polymer materials being used are all transparent to some extent; the only

difference is the grade of transparency. And different working process of material will give different influence on finished products. However, as people's understanding of product quality guarantee is becoming deeper and deeper, great importance is attached to permeability (including permeability to gas and water vapor) of package material. The using of high permeability material is one of the effective ways to prolong the guarantee period of some products (such as dairy products, meat food, beverage and juice).

3. Permeability of Transparent Material

The generally recognized high permeability materials are PVDC , EVOH and PAN. In aspects of oxygen permeability, EVOH is better than PVDC and PVDC is better than PAN. While for water vapor permeability, EVOH is better than PVDC and PVDC is better than PAN. Under conditions of high humidity, permeability of EVOH will decrease significantly. Permeability of PAN will also drop greatly with the increase of environment humidity. PVDC has is the best in terms of comprehensive property. Generally, PA and PET are considered as high permeability material. In fact, permeability of aluminum foil and aluminum plated film is very excellent. That these materials are less influenced by environment and have a good lightproof function made them once occupies important position in the field of higher permeability package.

When being used alone, high permeability material will present defects such as expensive in price and sensitive to water. That is why it is always used as one layer of complex film to offer permeability. The protection of other layers will improve its applicability effectively and reduce the cost as well. At present, high permeability complex film in the market includes three-layer complex, five-layer complex and seven-layer complex. Among them, some use one layer high permeability material and some adopt multi-layer high permeability material.

High permeability materials made of PVDC , PA , EVOH have excellent transparency. Labthink lab has received many high permeability specimens with excellent transparency. Through large amounts of testing data, we can see that permeability of material is directly influenced by the thickness and quality of permeable layer of the material. And the structure design of complex film is also a factor influencing the final permeability. We have once performed auto gas permeation testing of a kind of complex film with seven layers, the results showed that its auto gas permeability is better than common aluminum plated film and can be compete with that of aluminum foil. It has high grade of transparency and is better than aluminum foil in aspects of printing, tensile, heat sealing and folding strength. The newly developed silicon coated film abroad made by evaporate SiO₂ and SiO on base material has an excellent permeability. It is transparent and suitable for package of high temperature steam cooked food. All that made it the new star of high permeability materials.

4. Application of Transparent High Permeability Material

Comparing with glass package, plastic package is transparent, light in weight, nonbreakable , easy to carry, easy to design, convenient to use and low in cost, which secure it a wide developing prospect. High permeability complex film is widely used in various packages, such as transparent vacuum package for cold storage metal. Sheet material can be used for various

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transparent packages, such as capsule blister package. When made as container with blown technology, it can be used to contain product that have high requirement for permeability in the form of liquid, powder, pasty or block. At present, PET container has the best permeability among plastic containers. With excellent oxygen permeability and good shading effect against ultraviolet ray, PET has successfully replaced glass package in the field of milk, beverage, and juice package. And by blending with PEN, surface coating and multi-layer complex, its permeability can meet the package requirement of beer. Now, PET has found certain application in beer package of domestic and foreign market as well.