

Advances in Airtight Paperboard Packaging

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ABSTRACT

New market development is towards an airtight paperboard package for dry foods, which is achieved through a combination of specially developed non-foil paperboard, optimized heat-sealing, raw-edge protection and innovative lid sealing. The package is suitable for snacks, cereals, confectionery, biscuits, tea, regular-, and instant coffee. Along with the new packaging non-destructive package leak detection system is need to verify package tightness in order to optimize barrier level of packaging material. Stora Enso has introduced the unique Stora Enso AT Master tightness-testing equipment, based on tracer gas, for verifying tightness and sealing integrity of airtight packages. It is a fast and accurate solution for verifying the tightness and sealing integrity of airtight packages. The system can be integrated into the packaging line and used both before and after filling and lidding.

INTRODUCTION

Lot of work has been done towards an airtight paperboard packaging. Latest developments are on package tightness verification. Airtight packages based on the use of paperboard offer several benefits from improved product safety and prolonged shelf-life to the branding opportunities offered by the printing and converting capabilities and the environmental goodwill. Development of the concept requires strong expertise in substrate materials, barrier coating options and production, filling and tightness testing technology.

Stora Enso has brought on the market an airtight paperboard package for dry foods, which was achieved through a combination of specially developed non-foil paperboard, optimized heat-sealing, raw-edge protection and innovative lid sealing. The water-vapor barrier of the material protects the contents against caking, loss of crispiness, mold growth, softening of texture and change in color, taste and odor. Oxygen barrier protects the packaged food against rancidity, loss of vitamins, growth of microbes, oxidation of lipids and change in color, taste and odor. The package is suitable for snacks, cereals, confectionery, biscuits and tea, for example.[1,2]

Raw edges and seal tightness has a significant influence on barrier properties of the package. Package with raw edge protection improves 60 times [$\text{cc}/(\text{m}^2 \text{ day})$] oxygen transmission rate in tropical conditions ($38^\circ\text{C} / 90\% \text{RH}$) compared to package without raw edge protection. Water vapour transmission rate for the package in tropical conditions ($38^\circ\text{C} / 90\% \text{RH}$) can be improved 3 times better [$\text{g}/(\text{m}^2 \text{ day})$] with raw edge protection than without raw edge protection. Tightness of the seams has an effect 10-30% to barrier properties of the package. The better the gas barrier properties of a material, the more effect on tightness leakages have.[2]

Package leak detection system

Stora Enso Tightness-Testing Equipment is a non-destructive package leak detection system suitable for all kinds of packages. It is a fast and accurate solution for verifying the tightness and sealing integrity of airtight packages. The system can be integrated into the packaging line and used both before and after filling and lidding.

Tightness-testing equipment uses hydrogen as a tracer gas, as it does not affect the quality of the packaged food. In the tracer gas test, the package is filled with a gas compound containing hydrogen and nitrogen, and a detector sensor is used to scan potential leakage points. In the detecting station, the tracer gas hydrogen is forced out of the package in the event of a leak. The results guide fine-tuning of the production process in order to eliminate any defects. Thanks to fast feedback to the packaging line, tightness-testing equipment efficiently reduces the number of products rejected due to leaky packaging. [2,3,4,5]

With tightness-testing equipment H₂ leak detector is possible to detect even a leakage through 1 µm (diameter) within a few seconds. H₂ leak concentration can be calculated when knowing the diameter of the hole. It is also possible to calculate the theoretical size of the hole after measuring the H₂ leak signal. Water vapour transmission does not have a significant effect on package tightness, if the diameter of the leak point is less than 300 µm in tropical conditions. [2,5]

CONCLUSIONS

The advantages of barrier coated dry food packaging are many. Fewer package components are required as well as less phases in the production process. Optimization of barrier properties of packaging material can be made when knowing the tightness of the package. More user-friendly package designs and opening and closing mechanisms can be made and packages fit easily to existing recycling schemes. Profitability is enhanced throughout the supply chain, from the food manufacturer to the retail store.

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