

VACUUM PACKAGING

Tips-Tricks and Details

Most of the investors does not know everything about vacuum packaging of food in packaging world. Because of that we collected some of very helpful knowledge. I hope you will enjoy.

What is the technique

Vacuum packing is a method of packaging that removes air from the package prior to sealing. This method involves (manually or automatically) placing items in a plastic film package, removing air from inside, and sealing the package. The intent of vacuum packing is usually to remove oxygen from the container to extend the shelf life of foods and, with flexible package forms, to reduce the volume of the contents and package.

Vacuum packing reduces atmospheric oxygen, limiting the growth of aerobic bacteria or fungi, and preventing the evaporation of volatile components. It is also commonly used to store dry foods over a long period of time, such as cereals, nuts, cured meats, cheese, smoked fish, coffee, and potato chips. On a more short term basis, vacuum packing can also be used to store fresh foods, such as vegetables, meats, and liquids, because it inhibits bacterial growth.

Vacuum packaging of food is a kind of preservation technique which is very useful in modern retail trade. This type of packaging slows the growth of a large number of micro-organisms which require oxygen to proliferate.

In an oxygen-depleted environment, anaerobic bacteria can proliferate, potentially causing food-safety issues. Some pathogens of concern in vacuum packed foods are spore-forming non-proteolytic *Clostridium botulinum*, *Yersenia enterocolitica*, and *Listeria monocytogenes*. Vacuum packing is often used in combination with other food processing techniques, such as retorting or refrigeration, to inhibit the growth of anaerobic organisms.

Vacuum Packaging supports lots of advantages for investors, markets and ultimate consumers:

- ❖ Optimise purchases and avoid waste
- ❖ Increase the size of the products and requires less spaces on shelves
- ❖ Hygienically preserves of the product
- ❖ Supports long shelf life

All this is made possible with the purchase of a professional vacuum chamber packaging machine and the use of suitable bags. Vacuum machines can be one or two chambers.

Single Vacuum Chamber Machines

Single chamber sealers require the entire product to be placed within the machine. Like external sealers, a plastic bag is typically used for packaging. Once the product is placed in the machine, the lid is closed and air is removed. Then, there is a heat seal inside the chamber that will seal the bag, after sealing the bag the chamber is refilled with air by the automatic opening of a vent to the outside. This oncoming pressure squeezes all remaining air in the bag. The lid is then opened and the product removed. Chamber sealers are typically used for low-to-medium-volume packaging. This style of vacuum machine is also capable of sealing liquids due to equal pressure in the chamber and the bag eliminating the risk of the liquid being sucked out of the open edge of the bag.

Double Vacuum Chamber Machines

Double chamber sealers require the entire product to be placed in a plastic bag within the machine. Once the product is placed in the machine on the seal bar, the lid is closed and air is removed. Then a seal bar inside the chamber seals the product in the bag, after sealing the bag the chamber is refilled with air by the automatic opening of a vent to the outside. This oncoming pressure squeezes all remaining air in the bag. The lid is then opened and the product removed. Double chamber sealers are typically used for medium-volume packaging, and also have the capability to vacuum seal liquids. The lid generally swings from one side to another, increasing production speed over a single chamber model. Double chamber vacuum packaging machines generally have either spring-weighted lids or fully automatic lids.

Long shelf life for Food

All vacuum packaged products, preserved at low temperatures, keep for longer periods of time. Their shelf life is increased without compromising organoleptic properties such as quality, colour, aroma and flavour.

When is a modified atmosphere needed?

With modified atmosphere vacuum packaging (MAP), the air is removed from the bag and a measured mixture of gases is added, which effectively contrasts the natural decay of the product, increases shelf life, controls the level of humidity and prevents the product from being crushed (e.g. fresh pasta).

At times, red meat may darken and this problem is counteracted by the addition of oxygen mixed with nitrogen and carbon dioxide, which helps preserve the colour for many days.

Vacuum Cooking (Sous-Vide)

By cooking in vacuum, water boils at a temperature lower than 100°C and this preserves the more sensitive components of the food. Many useful elements such as vitamins, proteins and fats as well as aromatic substances remain unaltered. This technique requires the use of suitable heat-resistant vacuum bags.

The Hygiene, Quality, Appearance and Freshness of the product are maintained intact over time.

Shelf Life

However, not all products have the same shelf life. Some examples written below: (The vacuum packaged product must be kept in a refrigerator from +1°C to +4°C)

- ❖ FRESH MEAT can be kept for approximately 20/30 days.
- ❖ FRESH FISH can be kept for approximately 10 days.
- ❖ Fresh egg pasta can be kept for approximately 15 days.
- ❖ Cheese and cured meats can be kept even for several months.

Generally, the shelf life is lengthened 3 to 5 times the normal time. The storage space of products in the fridge can be reduced, since vacuum packaged products of different types can be stored together in the same fridge, one on top of the another, without the danger of contamination of flavours, colours and smells.

What benefits does a vacuum packaging provide?

Pre-prepared foods such as fresh or sliced meats, fish, poultry, vegetables, fruits, salads and cheeses can be stored for several days without reduced quality. By pre-portioning soups, sauces and completed dishes you can reduce food wastage. All these benefits help increase efficiency in the kitchen. Cooked and raw food can be hygienically stocked in vacuum pouches for storage in the fridge or easily transported between locations with minimal risks of cross-contamination.

- ❖ Quality
- ❖ Freshness
- ❖ Appearance
- ❖ Elimination of smells
- ❖ Advanced food preparation
- ❖ Portion control
- ❖ Reduced food wastage
- ❖ Lower food costs
- ❖ Safer food storage
- ❖ Higher standards of food hygiene

What kind of foods and materials?

- ❖ Fresh & Marinated Meat
- ❖ Fish
- ❖ Cheese
- ❖ Vegetables
- ❖ Pasta
- ❖ Sauces
- ❖ Fruit
- ❖ Soup
- ❖ Legumes
- ❖ Sliced or baton sausage
- ❖ Candy / Chocolate
- ❖ Grain
- ❖ Grab-and-Go Snacks (beef jerky, snack sticks)
- ❖ Pharmaceutical and Medical Products

Even solid items sensitive to dust and humidity can be vacuum packaged.

Details

- ❖ A certain amount of oxygen will remain, however, because it is not possible to create a total vacuum. Air contains around 21 per cent oxygen at normal atmospheric pressure – 1000 millibar. As the air is withdrawn during the vacuum packaging process, the pressure inside the package is reduced. If, for example, the pressure is reduced to 100 millibar, an equivalent of around 2.1 per cent oxygen will remain; if it is reduced to 10 millibar, there will still be in effect 0.21 per cent oxygen present.
- ❖ Use only bags for vacuum packaging and alimentary use (generally marked with the symbols PA/PE or Polyamide/Polythene).
- ❖ Bags for vacuum cooking are also available on the market, which resist temperatures up to 90/110 °C.
- ❖ It is recommended, when using CO₂, to use “barriered” type bags (bags preventing leaks of this mixture) or vacuum bags with a thickness of 200 micron.
- ❖ Use technical food-grade gas mixtures (Nitrogen, Carbon Dioxide and Oxygen) only on the instructions of qualified staff from the manufacturing companies. Use compatible gasmix for the product that can lengthen its shelf life.
- ❖ MAP is certainly a more versatile process than vacuum packaging. Vacuum packaging is essentially a ‘one size fits all’ technology – it relies solely on removing air. MAP on the other hand can be tailored to the particular foodstuff, with different gases and different proportions of gas in the mixture used to give the maximum shelf life for the particular product and to retain the quality and appearance of the product.

For example for packaging seafood, the proportion of carbon dioxide and oxygen in the modified atmosphere can be varied depending on the type of fish: oily fish benefit from a different atmosphere compared with, for example, prawns. The gas mixture used for red meat is different to that used for, say, bread.

- ❖ One area where MAP does score well when compared with vacuum packaging is in the presentation of the product. In vacuum packaging, as the pressure within the packaging is reduced the packaging material collapses and forms itself tightly around the product. For some products, such as fresh meat, this can distort the appearance of the product. Other products, such as shredded cheese, are not suitable for vacuum packaging because the pressure of the packaging material on the product would cause the product to deform and to lose important characteristics.
- ❖ Another aspect in which the two processes differ is in the ease of quality control of the packaging process. In MAP packaging, air is flushed from the package and replaced with the gas mixture, making it possible to constantly monitor the gas content of the package during the packaging process. Once the package is sealed, any leakage of the modified atmosphere can be detected, enabling the integrity of the seal to be assured. For vacuum packaging, because there is no gas present in the package, leak testing is typically done through manual inspection, making quality control less straightforward.
- ❖ In today's world a lot of emphasis is placed on eliminating salt and fat from our diets and increasing natural oils. More of us are trying to eat fish which is rich in omega-3 fatty acids as these lower blood levels of triglycerides, which have been linked to cardiovascular disease.
- ❖ Fish oils do deteriorate faster than the fat found in meat such as beef, chicken and pork. You can keep fish well wrapped in a fridge for two days and in a freezer for two months. By vacuum packing these foods you can preserve all the natural goodness and taste for four to six days in the fridge or frozen for two years.
- ❖ Air causes moisture to evaporate. One of the reasons we package or wrap food is to keep it from drying out. How many of us reach a few slices down into the loaf of bread to find the softer slices? Vacuum packing is a much better way to pack food because the air removal keeps the food moist.
- ❖ When foods are frozen without preparation, freezer burn can occur. It happens when the surface of the food is dehydrated and this causes a dried and leathery appearance. The flavour and texture of foods can also be ruined, vacuum packing reduces freezer burn as it protects the food from exposure to the cold, dry air.
- ❖ There are a lot of types of vacuum bag. Different materials (Plastic/laminated aluminium or paper) and different dimensions and different thickness is available. Mostly the bag formula is like 20% - Polyamide (PA) and 80% - Polyethylene (PE). You should find your needs of your product. The temperature ratings is very important that your packaging style (frozen or heat). Generally the bags melting temperature is around ~140-170°C . But you can find ovenable bags or can find more resistant to minus degrees.
- ❖ You should be careful about bags OTR (Oxygen Transfer Rate) and MVTR (Moisture Vapor Transfer Rate) specifications.
- ❖ Bag thickness is very important. Bag must be resistant to puncture. You should choose your bag types as compatible to your product.



