VACUUM PACKING

BASIC NOTIONS

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INDEX

1. INTRODUCTION: VACUUM PACKING AND FOOD SPOILAGE

1.1. WHAT IS VACUUM PACKING?

Vacuum packing is the process of extracting the air from around a product and sealing it inside an impermeable package. The air is extracted to extend the useful life of products with regard to their normal shelf life.

1.2. WHAT IS FOOD SPOILAGE?

Food is a biological substance and is sensitive. Its freshness and useful life are affected by the inherent properties of the food as well as external factors.

Internal factors	External factors
Type and quantity of micro-organisms	Temperature
Water activity	Hygienic conditions
Ph	Gases in the atmosphere
Cellular respiration	Processing methods
Composition of the product	

Therefore, the way in which the food is handled during the process prior to vacuum packing is extremely important.

Basically, food spoils due to a chemical/bio-chemical deterioration. Microbial deterioration begins immediately after the harvesting or slaughtering due to the presence of micro-organisms that are found in the raw materials, the ingredients or the environment. Micro-organisms are all around us: on our skin, our tools and even in the air itself. That’s why it’s essential to maintain strict hygiene conditions along the whole food processing chain.

The way in which micro-organisms affect the product varies depending on the type of organism and the product itself.

Micro-organisms can be divided into two types: aerobes and anaerobes. Aerobic organisms need the presence of oxygen (O_2) to survive and reproduce. However, anaerobic organisms grow without oxygen.

2. VACUUM PACKING

Vacuum packing is a **natural** food **conservation** technique that consists in extracting the air from the bag or container, removing the oxygen, the main factor in food spoilage.

By vacuum packing, we:

- Extend the useful life of any perishable product by up to 2 to 4 times.
- Protect the product from external influences.

By removing the air surrounding the product, the bacterial growth of moulds and fungi is inhibited as they need oxygen to grow. Once the air is removed and the bag is sealed, the oxygen levels continue to fall as the levels of carbon dioxide rise. This reduces the growth of organisms responsible for spoilage, allowing the useful life of the product to be prolonged.

2.1. VACUUM PACKING HAS MULTIPLE APPLICATIONS IN THE KITCHEN:

2.1.1. PACKAGING OF RAW OR CURED FOODS.

FRESH PRODUCTS: meats, vegetables, pastas, fish, etc.

By vacuum packing:

- We alienate the product from any contaminant
- We prolong the shelf life
- We avoid loss caused by excess drying
- We avoid the mixing of odours
- Gas packaging is recommended for products with fragile textures.
- If we freeze the vacuum packed product, its conservation period is prolonged.

CURED PRODUCTS: hams, cold meats, pickled products, etc. Their shelf life is naturally long.

By vacuum packing:

- The expiry time is prolonged
- They don’t lose weight or dry out
- They can be stored without the odours mixing together

2.1.2. PACKING OF TRADITIONALLY COOKED FOODS.

They are cooked traditionally before packing.

Processes:

- After cooking, the product is practically uncontaminated.
- Quick cooling from +65ºC to +10ºC in less than two hours at the centre of the product to prevent the development of micro-organisms.
- Vacuum packing
- Storage: 0-2ºC / -18ºC

By vacuum packing:

- The preparation work is made easier
- The life of the product is extended
- The risk of losing the product is reduced

2.1.3. SOUS-VIDE COOKING.

Sous-vide cooking involves placing the food product into an airtight and heat resistant container, extracting the air inside it and then sealing it. After this, it is exposed to a heat source to cook it.

Advantages of sous-vide cooking:

- Preserves nutritional qualities
- Preserves hygienic conditions
- Reduces weight loss as it avoids evaporation and drying
- Simplifies and streamlines service (heat the portion, plate up and serve)
- Rationalises planning of work
- Prolongs conservation time

Further information:

Vacuum or sous-vide cooking: basic principles

https://www.sous-vide.cooking/

2.1.4. PACKAGING IN A PROTECTIVE ATMOSPHERE.

This involves modifying the atmosphere surrounding the product.

The objectives of packing in a protective atmosphere are, basically:

(1) To prolong the useful life of the product without using additives or preservatives. It involves modifying the atmosphere surrounding the product, inhibiting deterioration mechanisms such as the growth of micro-organisms, oxidation or enzymatic action.
(2) To avoid products such as salads, pastries, cannelloni, etc. becoming crushed.

2.1.5. FREEZING OF VACUUM-PACKED FOOD.

Traditional freezing techniques conserve the product, but not its quality.

By vacuum packing and freezing the packed product:

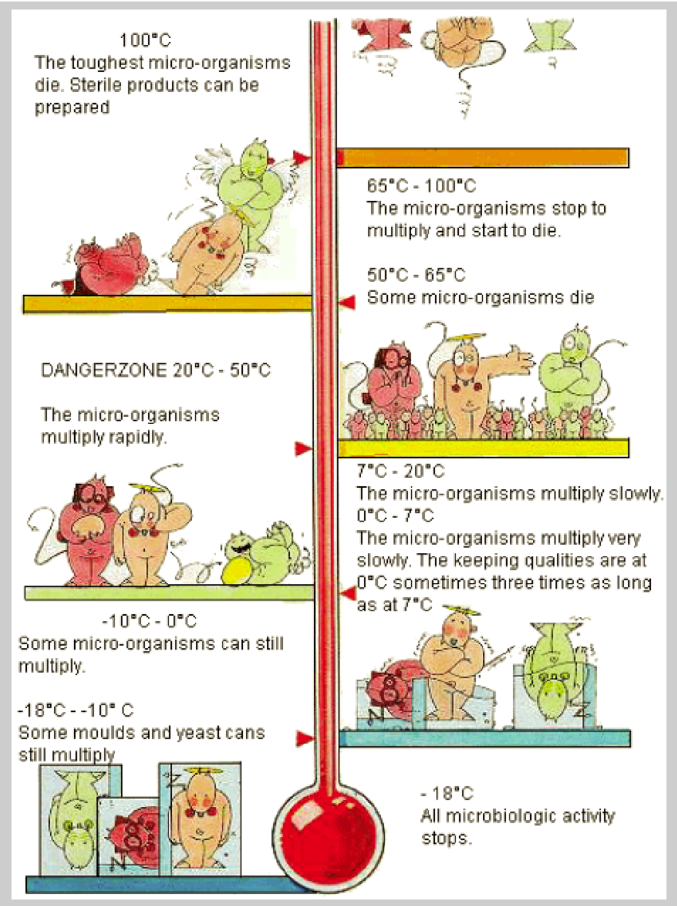
- There's no exterior burning
- There's no surface crystallisation
- There's no loss of taste and smell
- There's no drying
- There's no fat oxidation

2.2. ADVANTAGES OF VACUUM PACKING

- Maximum yield of staff working hours by taking advantage of idle times.
- Better utilisation of the product, due to:
  - Reduction in cooking loss due to the absence of loss from steam or evaporation. The vacuum packed product maintains its weight.
  - Working in a hurry is avoided and is carried out outside peak times.
- Regular portioning: cost calculation with precision
- Rational storage in chambers: stock control and rationalization of procurement
- Use of best shopping days
  - Purchasing opportunities
  - Reduction in travel
  - Larger purchases, obtaining better conditions and allowing improvement in bargaining power
- Vacuum packing can enhance the quality of the product. The curing or maturing period of vacuum packed meat conserved between 0 and 2ºC isn't disrupted as long as we leave a percentage of air inside to allow it to evolve.

2.3. VACUUM PACKING AND THE CONSERVATION TEMPERATURE OF THE PRODUCT

Some organisms are resistant to high levels of carbon dioxide and their growth becomes slower at low temperatures which is why it's necessary to refrigerate some vacuum-packed products.



100ºC *The most resistant micro-organisms die. Sterile products can be prepared.*
65-100ºC *Micro-organisms stop reproducing and begin to die.*
50-65ºC *Some micro-organisms die.*
20-50ºC DANGER ZONE *Micro-organisms reproduce quickly.*
7-20ºC *Micro-organisms reproduce slowly.*
0-7ºC *Micro-organisms reproduce very slowly. At 0ºC, qualities are sometimes maintained for 3 times longer than at 7ºC.*
-10-0ºC *Micro-organisms can still reproduce.*
-18º- -10ºC *Some moulds and fungi can reproduce.*
-18ºC *All microbiological activity stops.*

2.4. VACUUM PACKING AND THE PRODUCT'S USEFUL LIFE

In the table below, the useful life of different products is compared with and without vacuum packing.

PRODUCT	USEFUL LIFE WITHOUT VACUUM PACKING	USEFUL LIFE WITH VACUUM PACKING
Fresh meat	2-4 days	x 5
Poultry	4-7 days	x 3
Cooked meat	2 days	x 12
Fresh fish	2-3 days	x 2
Cheese	2-3 weeks	x 3
Pasta / pizza	4-7 days	x 3
Prepared meals	2-5 days	x 4
Fruits and vegetables	2-14 days	x 3
Cold meats	4-8 months	x 3

Note: *the positive result of the product's useful life doesn't only depend on the packing. It will depend, to a great extent, on the good working and reception system of raw materials.*

2.5. PASTEURISATION

Pasteurisation is a thermal process to which the food is exposed to guarantee its quality by reducing the pathogens it may contain (bacteria, moulds and yeasts).

In pasteurisation the primordial aim is not to completely eliminate the pathogens, but rather significantly reduce their populations seeking levels that will not cause poisoning.

It is a relatively gentle treatment, as it entails temperatures below 100°C. It is used to prolong the useful life of foods for several days or months. This is why they need cooling or freezing for optimum maintenance.

Unlike sterilization, pasteurization does not destroy spores of microorganisms.

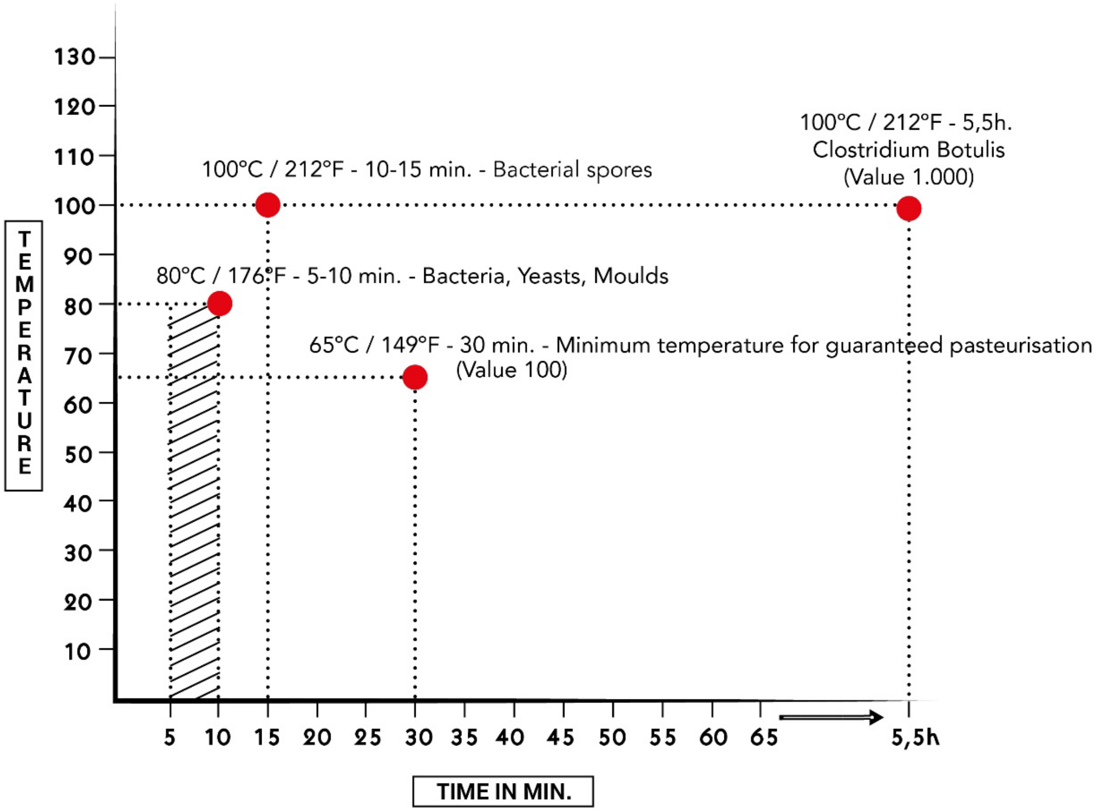
HOW DO YOU PASTEURISE RELIABLY?

- Pasteurisation entails reaching 65ºC at the centre of the product for at least 30 min.
- The longer the exposure time to the higher temperature, the greater the pasteurisation value of the product.

WHAT IS THE PASTEURISATION VALUE OF THE PRODUCT?

- The pasteurisation value is equivalent to the time the food has been kept at a constant or increasing temperature.
- The pasteurisation value 100 is equivalent to a shelf life of 21 days while the value 1,000 (the highest that there is) provides 42.
- The maximum shelf life permitted to date is 42 days.

TABLE OF TIMES/TEMPERATURES FOR PASTEURISATION



* Value of 100: Shelf life of 21 days
* Value of 1,000: shelf life of 42 days

PASTEURISATION TABLE FOR DAIRY PRODUCTS

TEMPERATURE	TIME	TYPE OF PASTEURISATION
63°C (145°F)	30 minutes	Pasteurisation LTLT
72°C (161°F)	15 seconds	Pasteurisation "High Temperature Short Time Pasteurization" (HTST)
89°C (191°F)	1.0 second	Ultra Pasteurisation (UP)
90°C (194°F)	0.5 seconds	Ultra Pasteurisation (UP)
94°C (201°F)	0.1 seconds	Ultra Pasteurisation (UP)
96°C (204°F)	0.05 seconds	Ultra Pasteurisation (UP)
100°C (212°F)	0.01 seconds	Ultra Pasteurisation (UP)
138°C (280°F)	2.0 seconds	Ultra high temperature sterilisation (UHT)
Source: IDFA website Page header: Pasteurisation: Definition and methods.		

TABLE OF USES AND MINIMUM TEMPERATURES OF USE WITH FOOD SAFETY

	Minimum temperature of use	Minimum temperature of conservation
Roasts, fillets, beef, pork and lamb chops	62.8°C	65°C
Minced beef, pork and lamb	71.1°C	65°C
Poultry	73.9°C	65°C
Dishes with egg, stews, etc.	71.1°C	65°C
Reheating	73.9°C	65°C
Fish	62.8°C	65°C

3. VACUUM PACKING MACHINE

There are different types of vacuum packing machines on the market.

Vacuum packing machines without chambers: these are domestic and semi-domestic models. The vacuum obtained will always depend on the model of vacuum packer, but it is always significantly lower than the one that can be achieved with a packing machine that has a chamber. Due to their construction, goffered bags must be used and they may offer the option of vacuum packing in containers.

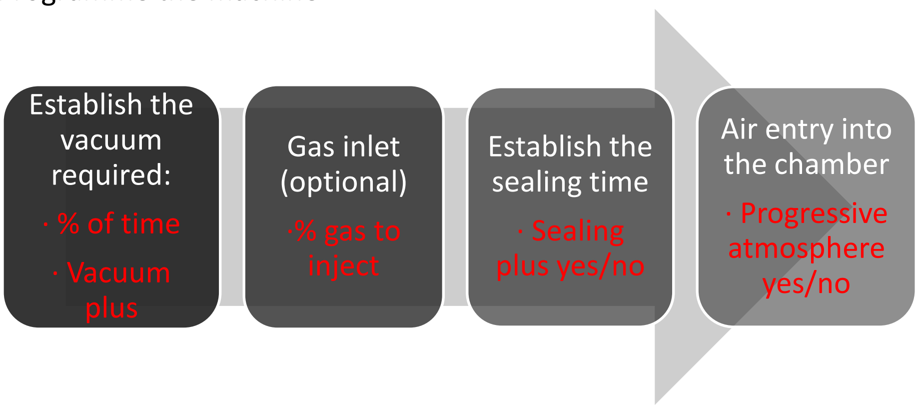
Vacuum packing machine with chamber: these are professional models that can attain a vacuum of up to 99% inside the chamber (98% for liquids: the colder the liquid, the greater percentage of vacuum that can be achieved). They may offer the option of vacuum packing in containers. **In this document, when we talk about "vacuum packing machines", we are referring to this type of machine.**

The main components of a vacuum packing machine with a chamber are:

- The vacuum chamber: which normally has a methacrylate lid and hermetic locking
- The vacuum pump: sucks the air out of the chamber until a 99% vacuum is achieved
- Vacuum control
- Time and type of sealing
- Progressive air entry
- Possibility of storing programmes

The vacuum packing process in the chamber:

- Programme the machine



- Place the product inside the bag
- Put the bag on top of the sealing bar, making sure that there are no creases
- Close the lid. The pump will start up
- When the required vacuum is reached, (the gas is injected and) the sealing is completed
- Air entry into the chamber

4. SAMMIC VACUUM PACKING MACHINES

The Sammic vacuum packing machines come in two ranges, Sensor (S) and Sensor Ultra (SU). ALL of the models are equipped with a Busch vacuum pump and allow vacuum control with Sensor. In the following table we present the main differences between both ranges.

CHARACTERISTIC	SENSOR (SE)	SENSOR ULTRA (SU)
Vacuum pump		
Equipped with Busch pump	✔	✔
Vacuum process		
Sensor controlled vacuum	✔	✔
Vacuum measurement	Percentage	Percentage / absolute (mbar/hPa)
Vacuum plus (time)	✔	✔
Double sealing	✔	✔
Soft decompression	By impulses	Progressive (Softair)
Control panel		
Display / keyboard	Digital LED / Membrane	LCD Colour 3.9" / Touch screen
Display of the programme values	Phase in progress	All values
Software languages	-	6 languages
Programming		
Programme storage	1	25
Programme blocking	-	✔
Extra functions		
Control of liquids	Standardisation with vacuum %	Automatic evaporation detection
Pause function (marinates, etc.)	✔	✔
Staged vacuum	-	✔
Vac-Norm ready	✔	✔
Vac-Norm control	Control by sensor	Control by sensor
Oil drying programme	✔	✔
Diagnostic system	Keyboard	Keyboard and PCB
Packing machine options		
Sealing plus for metal bags	-	✔
Bluetooth connectivity for printer	-	✔
Inert gas inlet	-	✔
Accessories (extras)		
Vacuum packing bags (80ºC)	✔	✔
Vacuum packing and cooking bags (120ºC)	✔	✔
Vac-Norm external vacuum kit	✔	✔
Bag cutting kit	From series 400	From series 400
Support for liquids	✔	✔
Additional filler plates	✔	✔
Printer	-	✔
Labels for printer	-	✔
Support	For series 400/500	For series 400/500
App for programming and printing	-	✔

Further information:
https://www.sammic.com/catalog/food-preservation?ss=
Download catalogues
Sensor Range
Sensor Ultra Range

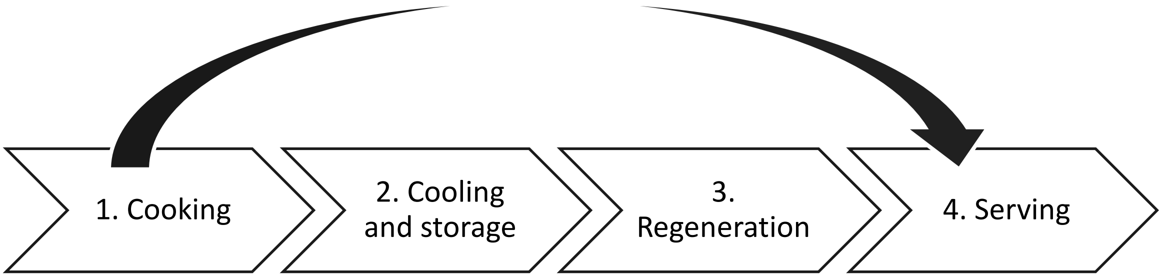
5. VACUUM OR SOUS-VIDE COOKING: BASIC PRINCIPLES

Sous-vide cooking involves placing the food product into an airtight and heat resistant container, extracting the air inside it and then sealing it. After this, it is exposed to a heat source to cook it.

Advantages of sous-vide cooking:

- Preserves nutritional qualities
- Preserves hygienic conditions
- Reduces weight loss as it avoids evaporation and drying
- Simplifies and streamlines service (heat the portion, plate up and serve)
- Rationalises planning of work
- Prolongs conservation time

The sous-vide cooking process:



1. **COOKING**
• Cooking at low temperatures. Pasteurisation. • Cooking times. 25-125% greater than traditional cooking • A humid environment is required. The water content will come from the product itself or due to water being added when carrying out the vacuum • Means: • Sous-vide cooker (SmartVide) or bain-marie with thermostat. • Low pressure steam oven. • Wet steam oven. • Temperature variation should not exceed +/-1ºC during cooking.
2. **COOLING AND STORAGE**

• Cooling: refrigeration or deep-freezing.
• This should be completed immediately after cooking:
  o To stop the cooking process.
  o To prevent the development of micro-organisms.
• To cool, the blast chiller is used.
• Storage:
  o Refrigerated dishes: 0-3ºC.
• Frozen dishes: <-18ºC

3. **REGENERATION**

Regeneration, to return the food to conditions in which it can be eaten.
• The process should begin immediately after the product is removed from the refrigerator.
• The temperature recuperation mustn't exceed more than one hour at the heart of the product.
• Methods to employ:
  o Convection oven.
  o Bain-marie
  o Steam cooker
  o Traditional methods, removing the product from the bag
• If a regenerated product isn't consumed, it can't be stored again.

4. **SERVING**

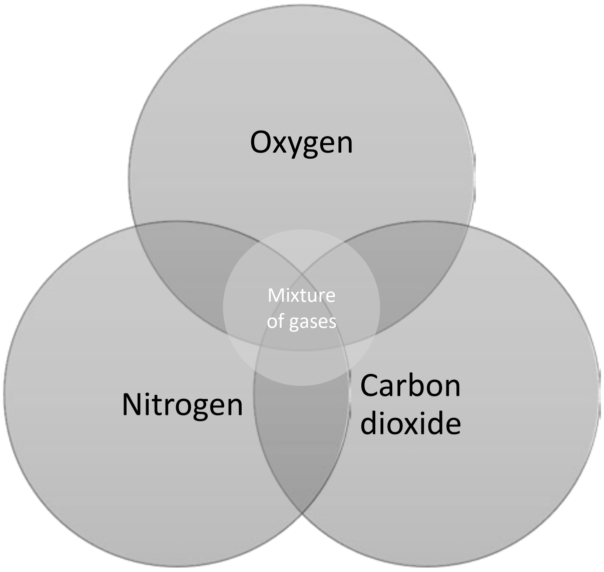
THE DECALOGUE OF VACUUM COOKING

1. Ensure perfect hygiene of the premises, the utensils and products.
2. Control personal health, hygiene and clothing of staff.
3. Use fresh raw materials.
4. Achieve a vacuum of 99%
5. Cook at over 65ºC.
6. Fast cool (<2h) under 10ºC.
7. Label containers with production and expiry date.
8. Store in refrigerators between 0-2ºC.
9. Store in a fresh environment for 6-21 days maximum.
10. To serve, a temperature of over 65ºC at the heart of the product must be reached in less than 1 hour.

Further information:
https://www.sous-vide.cooking/

6. PACKING IN A PROTECTIVE ATMOSPHERE (E.A.P.)

For packing in a protective atmosphere (E.A.P.), different gases and mixtures of gases are used, depending on the product being packed and the desired objective. To do this, gases or mixtures of gases are used. Below, we give the main properties of the most commonly used gases, but we recommend that you contact the gas supplier to get advice regarding the ideal gas or mixture of gases for each product or requirement.



OXYGEN	NITROGEN	CARBON DIOXIDE
Colourless, odourless, tasteless	Colourless, odourless, tasteless	Colourless, odourless, acidic taste
	Insoluble in water and greases	Soluble in water and greases, producing a slight acidic taste
Inhibits the development of anaerobic micro-organisms	Inhibits the development of aerobic micro-organisms	In >10% concentration, it inhibits the development of bacteria and fungi
Preserves the colour of fresh meat	Avoids the container collapsing due to depression	Its properties are enhanced at low temperatures
Sustains the metabolism of fruit and vegetables	Displaces atmospheric oxygen, avoiding oxidations	

Some examples:

PRODUCT	PROBLEM	SOLUTION
Dry products: coffee, crisps, dried fruits, etc.	Oxidation	N_2 to displace air
Products with medium water content: pastries, bread, pizzas, etc.	Oxidation, bacteria, moulds	Low concentration of O_2. Introduce CO_2 as bactericide.
Products with high water content: meat, vegetables, etc.	Bacteria	Gas depending on product and client's requirements

MEAT	ADVANTAGES	DISADVANTAGES
Complete Vacuum	Optimum conservation and maturation	Brownish colour → rejected by client
With gas	Red colour → optimum presentation	Loss of shelf life
Recommendation: Consult gas supplier		

Indicative durations of food packaged in a protective atmosphere:

PRODUCT	CONSERVATION TEMPERATURE	APPROXIMATE DURATION
Red meat	0-4ºC	6-8 days
Bread	Room temperature	10-14 days
Fresh salad	2-4ºC	10-14 days
Fresh meat (with colour loss)	0-4ºC	Several weeks
Coffee	Room temperature	Several months

ADVANTAGES OF PACKING IN A PROTECTIVE ATMOSPHERE:

Packaging in a protective atmosphere allows the useful life of the product to be prolonged by days and even weeks. Products that, without this technology, couldn't be kept fresh along the supply chain can be sold in shops without loss of quality.

High quality increases sales

1. Less losses and returns
2. More rational and profitable production and distribution.
3. Improves profitability with completely new products

7. PACKAGING BAGS AND CONTAINERS

Packaging is normally done in bags. Some vacuum packing machine models, Sammic models included, also allow vacuum to be carried out in reusable containers especially designed for this purpose.

The packing material is of crucial importance and will determine the results obtained with the vacuum packing machine.

Different materials and combinations of materials are used depending on what the desired results are, for example:

- Mechanical resistance
- Vapour barrier to avoid loss of weight and dehydration
- Gas barrier
- Gas permeability
- Anti-fog properties (the inside of the material should have a surface that prevents the formation of water droplets that reduce transparency)
- Sealing properties
- Transparency or permeability of light

If you are going to sous-vide cook the vacuum packed product it is important for the bag to resist the temperatures required for cooking.

Sammic offers plain vacuum packing bags made from PA/PE in different sizes and with different temperature resistances and models of goffered bags (for vacuum packing machines without a chamber) as well as VacNorm containers with their lids for vacuum packing in reusable containers.

Sometimes, the machine must be adapted to the bags that are being used. For example, to seal metal bags, the sealing bar needs more strength than to seal non-metal bags. Many manufacturers offer packing models adapted for this purpose. **In Sammic packers equipped with the Sealing PLUS function, this function is activated by pressing a button, removing the need to have an adapted machine in order to seal this type of bags.**

8. PACKING LIQUIDS: ATMOSPHERIC PRESSURE AND BOILING WATER

When carrying out the vacuum in the bag, the atmospheric pressure is reduced and can reach 0.5mbar. At a lower pressure, liquids boil at a lower temperature. This means that liquids, even if they are not hot, boil during the vacuum packing process.

When they boil, liquids can come out of the bag, overflow into the vacuum chamber and/or compromise the sealing capacity of the bag.

The following table shows the different boiling temperatures of water according to the vacuum pressure:

Vacuum pressure (mbar)	1000	800	900	400	200	100	50	20	10	5	2
vacuum %	0	20	40	60	80	90	95	98	99	-	-
Boiling temperature (ºC)	100	94	86	76	60	45	33	18	7	-2	-13

There are different options in order to prevent the liquids being vacuum packed from boiling inside the chamber depending on the control function available with the packer.

1. **Packers with vacuum controlled by time.** The user should adapt the vacuum time so that the liquid doesn't boil, or manually press the stop button when the content inside the bag begins to boil. Given that the vacuum times vary according to the quantity of product inside the chamber, ***it is difficult to standardise processes*** in order to achieve a precise control of the boiling point.
2. **Packers with vacuum controlled by sensor (SE Range from Sammic).** These machines make it possible to achieve better control when packing liquids. By knowing the vacuum percentage at which a liquid boils when being packed, ***we can standardise processes with the control by sensor*** and ensure it never exceeds this point.
3. **Packers with detection of the evaporation of liquids (SU Range from Sammic).** The vacuum cycle stops automatically, stopping liquids from overflowing into the chamber and ***guaranteeing the maximum possible vacuum for each product***. The vacuum time and percentage is always the optimal time and percentage for the product being packed.

As a general rule, and regardless of the type of control offered by your packer, we can state that **the lower the temperature of the product to be packed, the greater the vacuum percentage that can be attained without the liquid boiling.**

9. VACUUM PACKING AND THE GASTRONOMIC VANGUARD

As well as conserving food, with all of the advantages that this implies, we can use vacuum packing to make cutting-edge cooking creations, using techniques such as:

Cold osmosis

Airy creations

Transparencies of fruit or vegetables

10. VACUUM PACKING GUIDE

PRODUCT	GROUP	TYPE OF BAG	VACUUM %	CONSERVATION TEMPERATURE	USEFUL LIFE
Sliced apples	FV	FR	99%	2-3ºC	6-8 days
Asparagus	FV	COOK	99%	2-3ºC	14-21 days
Salty bacon (raw)	M	CC	99%	2-3ºC	20-28 days
Beef (raw)	M	CC	99%	2-3ºC	24-88 days
Beef (cooked)	M	CC	99%	2-3ºC	28-35 days
Carrots (cooked)	FV	CC	99%	2-3ºC	14-21 days
Cheese (hard)	D	FR	97%	2-5ºC	2-3 months
Cheese (raw)	D	FR	99%	2-5ºC	14-21 days
Chicken (raw)	M	CC	99%	2-3ºC	8-18 days
Frozen chicken (raw)	M	CC	99%	-18ºC	4-5 months
Chicken (cooked)	M	CC	99%	2-3ºC	12-18 days
Chocolate	CER	FR	99%	2-3ºC	28 days
Chopped onion	FV	FR	98%	2-3ºC	6-8 days
Chopped parsley	FV	FR	98%	2-3ºC	7-10 days
Coleslaw	FV	CC	99%	2-3ºC	6-8 days
Biscuits	CER	FR	99%	15-18ºC	2 months
Vacuum cooked cauliflower	FV	CC	99%	2-3ºC	14-21 days
Corn grains	FV	CC	99%	2-3ºC	5-6 days
Crab claws	F	CC	99% Soft-Air	2-3ºC	8-12 days
Peeled cucumber	FV	CC	99%	2-3ºC	7-10 days
Eggs (cooked)	D	CC	99%	2-3ºC	12-14 days
Paté	M	CC	99%	2-3ºC	14-21 days
Slices of pears (cooked)	FV	CC	99%	2-3ºC	6-8 days
Pizza base	CER	CONS	99%	2-3ºC	21 days
Pork (raw)	M	CONS	99%	2-3ºC	12-14 days
Frozen pork (raw)	M	CC	99%	-18ºC	3-4 months
Pork (cooked)	M	CC	99%	2-3ºC	18-25 days
Potato salad	FV	CONS	99%	2-3ºC	4-8 days
Potato (raw) peeled	FV	CONS	99%	2-3ºC	4-8 days
Rice salad	CER	CONS	99%	2-3ºC	6-8 days
Salmon (raw)	F	CC	99%	2-3ºC	6-8 days
Frozen salmon (raw)	F	CONS	99%	-18ºC	1 year

Smoked salmon	F	CONS	99%	2-3ºC	14-21 days
Frozen smoked salmon	F	CONS	99%	-18ºC	1 year
Peeled tomatoes	FV	CONS	99%	2-3ºC	7-10 days
Turkey (raw)	M	CONS	99%	2-3ºC	8-18 days
Frozen turkey (raw)	M	CONS	99%	-18ºC	4-5 months
Turkey (cooked)	M	CC	99%	2-3ºC	12-18 days
Beef (raw)	M	CONS	99%	2-3ºC	15-20 days
Frozen beef (raw)	M	CONS	99%	-18ºC	1 year
Beef (cooked)	M	CC	99%	2-3ºC	21-25 days
Wild prey (frozen)	M	CONS	99%	-18ºC	1 year
Fish (cooked)	F	CC	99%	2-3ºC	10-15 days
White fish (raw)	F	CONS	99%	2-3ºC	8-10 days
White fish (raw) (frozen)	F	CONS		-18ºC	1 year
Oily fish (raw)	F	CONS	99%	2-3ºC	8-10 days
Oily fish (raw) (frozen)	F	CONS	99%	-18ºC	½ year
Smoked fish	F	CONS	99%	2-3ºC	14-28 days
Smoked fish (frozen)	F	CONS	99%	-18ºC	1 year
Fried rice	CER	CONS	97%	2-3ºC	10-16 days
Fruit salad (without banana)	FV	CONS	99%	2-3ºC	6-8 days
Green beans	FV	CONS	99%	2-3ºC	8-10 days
Lamb (raw)	M	CONS	99%	2-3ºC	12-18 days
Lamb (raw) (frozen)	M	CONS	99%	-18ºC	1 year
Lamb (cooked)	M	CC	99%	2-3ºC	18-25 days
Walnuts	CER	CONS	99%	15-18ºC	2-3 months
Pasta (raw)	CER	CONS	99%	2-3ºC	14-18 days
Pasta (cooked)	CER	CC	99%	2-3ºC	24-30 days