

Modified Atmosphere Packaging (MAP)

*Helping you to be
'retail ready'*

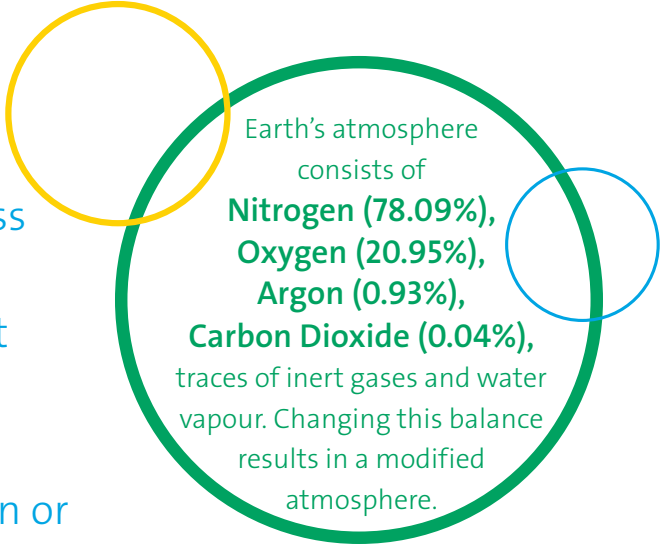


Packaging:
protection
preservation
& promotion
of your products



What is MAP?

Modified atmosphere packaging (MAP) is an established technology proven to significantly slow the process of decay and extend the shelf life of packaged foods, naturally and without preservatives. It works by replacing atmospheric air with carbon dioxide, nitrogen or oxygen, either on their own or in combination, depending on the product.



Earth's atmosphere consists of
Nitrogen (78.09%),
Oxygen (20.95%),
Argon (0.93%),
Carbon Dioxide (0.04%),
traces of inert gases and water vapour. Changing this balance results in a modified atmosphere.

Packaging in a protective atmosphere has never been more relevant. While the plastics debate continues to gather momentum, the importance and prevalence of food waste cannot be underestimated. MAP has its place in the debate for its ability to reduce food waste – providing an extended shelf life and maintaining the quality of food products and retarding microbial growth, without the need for additives.

reduce
food waste



Benefits of MAP

- Extends shelf-life by up to 50-500%
- Improves quality and appearance
- Significantly reduces food waste and spoilage, resulting in less packaging materials too
- Flattens seasonal production peaks
- Helps keep the integrity of the food, such as crisps, grated cheese, and ready meals
- Red meats and poultry retain their desirable raw red colour, as opposed to its brown oxidised form in skin packing
- Provides packaging benefits such as reduced drip loss and odour reduction, and keeps foods looking good throughout the supply chain

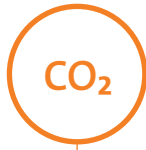
Which products are most suitable?

- Fresh, pre-packed convenience foods
- Vegetarian and vegan foods
- Raw meat, poultry, seafood and fish
- Bakery items
- Cheese
- Fresh prepared fruits and vegetables
- Snacks such as crisps, nuts and dried fruits



extends shelf-life

How the gases extend food shelf-life



Inhibits growth of most aerobic bacteria, yeast and moulds

Higher CO₂ = longer shelf-life



Inert gas used to exclude air and oxygen

Used as a balance gas (filler) to prevent pack collapse when using CO₂

Used in snacks, dried foods and products which contain oils or fats, to prevent oxidative rancidity



Maintains fresh, natural colour in red meats

Maintain respiration (fruit and vegetables)



by 50-500%

Gas mix guidelines



Prepared ready meals

30-50% CO₂ + 50-70% N₂

Shelf life to **10 days**

compared to up to 5 days in air



Breads & pastries

30-100% CO₂ + 0-70% N₂

Shelf life to **12 weeks**

compared to up to 14 days in air



Raw red meat

70-80% O₂ + 20-30% CO₂

Shelf life to **8 days**

compared to up to 4 days in air



Prepared fruit and bagged salads

5% O₂ + 5% CO₂ + 90% N₂

Shelf life to **10 days**

compared to up to 5 days in air



Raw Fish and Seafood

30% O₂ + 40% CO₂ + 30% N₂

Shelf life to **6 days**

compared to up to 3 days in air



Nuts, seeds and snacks

100% N₂

Shelf life varies – up to **2 years**

compared to up to 8 months in air



Raw Poultry

30-60% CO₂ + 40-70% N₂
20-30% CO₂ + 20-70% O₂ + 0-50% N₂

Shelf life to **21 days**

compared to up to 7 days in air



Cheese

100% CO₂ or 100% N₂
0-30% CO₂ + 70-100% N₂

Shelf life to **12 weeks**

compared to up to 4 weeks in air

Oxygen should not be used in concentrations over **21%** unless the packaging machinery is compatible. A guideline document *“The safe application of oxygen enriched atmospheres and packaging foods”* (BCGA 1998) is available.



improves quality & appearance

System components

Packaging materials and machines need careful consideration and vary considerably based on the food product itself. Humid foods should keep their moisture while dry foods should stay dry and crispy. Packaging should therefore protect against oxygen and water vapour transmission as well as keeping aromas inside the pack.

Water vapour barrier:

- This is especially important for meat products to avoid dehydration, or for bakery or dried foods which can degrade in humid environments and to prevent the growth of fungi.

Oxygen barrier (O₂):

- Many food products are susceptible to oxidative rancidity which can be prevented by packing food in an oxygen-free atmosphere.

Carbon dioxide barrier (CO₂):

- Carbon dioxide is important for prolonging the shelf life of many food products; providing a barrier to CO₂ can make the most of an extended shelf life.

Nitrogen barrier (N₂):

- Nitrogen is often used to displace oxygen in modified atmosphere packaging and therefore it is important to inhibit any N₂ loss in order to help food stay fresh for longer.

Aroma barrier:

- For some foods, the aroma is integral to the enjoyment of the product, such as coffee. Protecting the aroma through a barrier film is important for some products.

UV protection barrier:

- Photo oxidation can affect the appearance of some dairy and meat products and therefore a UV barrier may be specified.

Gas permeability:

- Most require a high barrier except fresh respiring produce that requires a semi permeable film.

Other factors to consider:

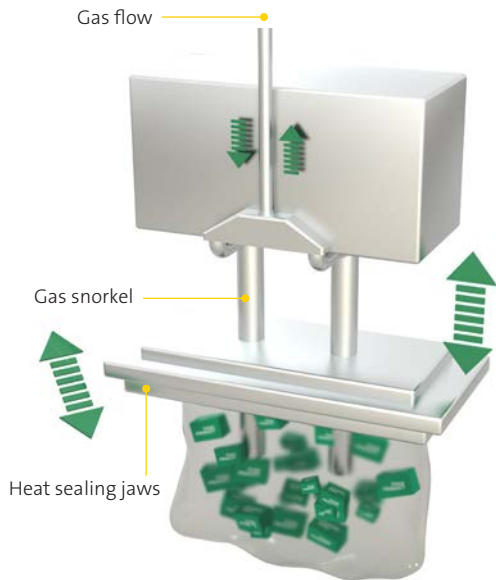
- Water vapour transmission rate
- Mechanical properties – strength, flexibility, even draw
- Sealing reliability – peelability, integrity
- Transparency – visibility, anti-fog, light barriers
- Microwaveability – ready to eat foods

For your free copy of our industry gold standard MAP handbook, please call: 0800 389 0202

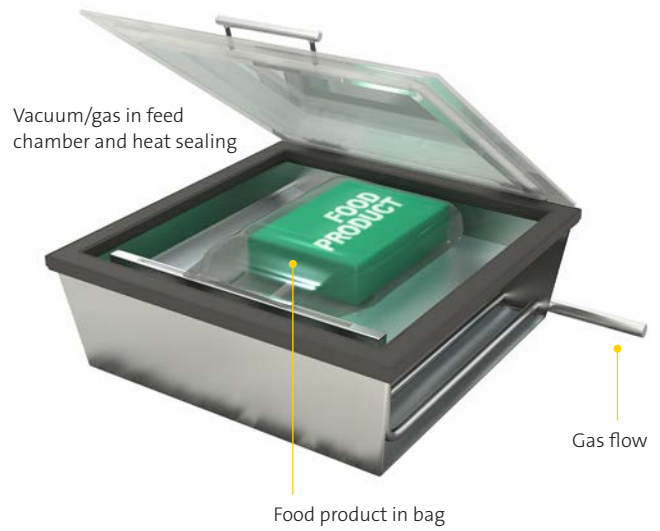


Types of food packaging machines

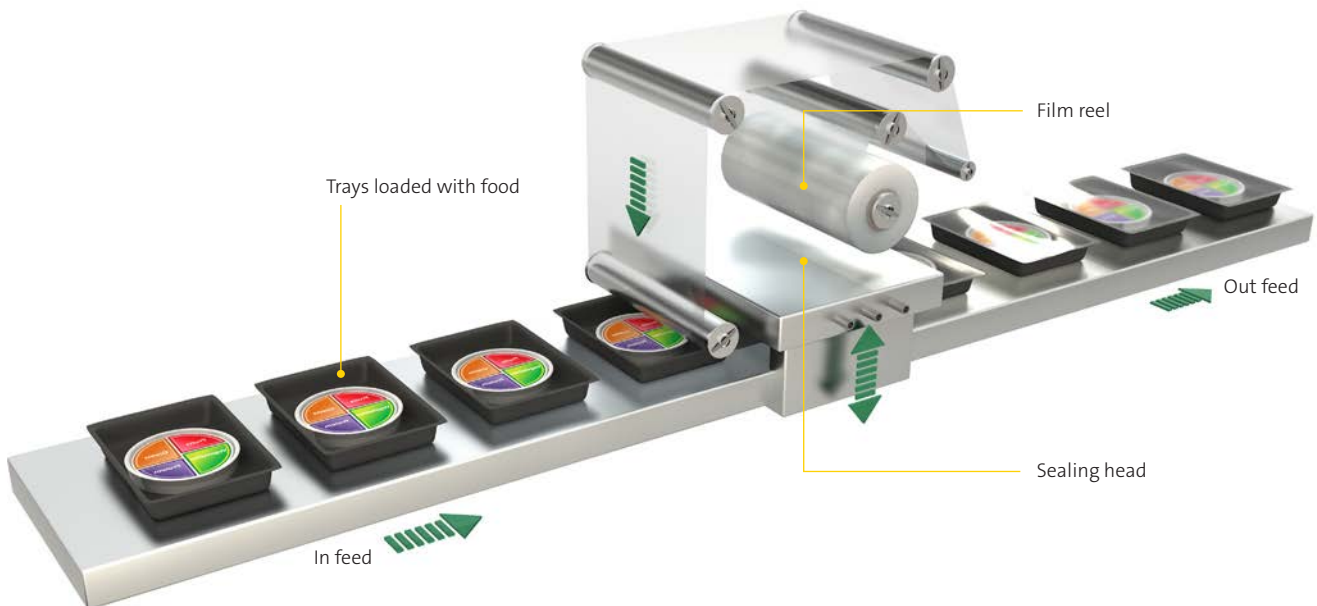
Snorkel type (ST)



Vacuum chamber (VC)



Tray lidding

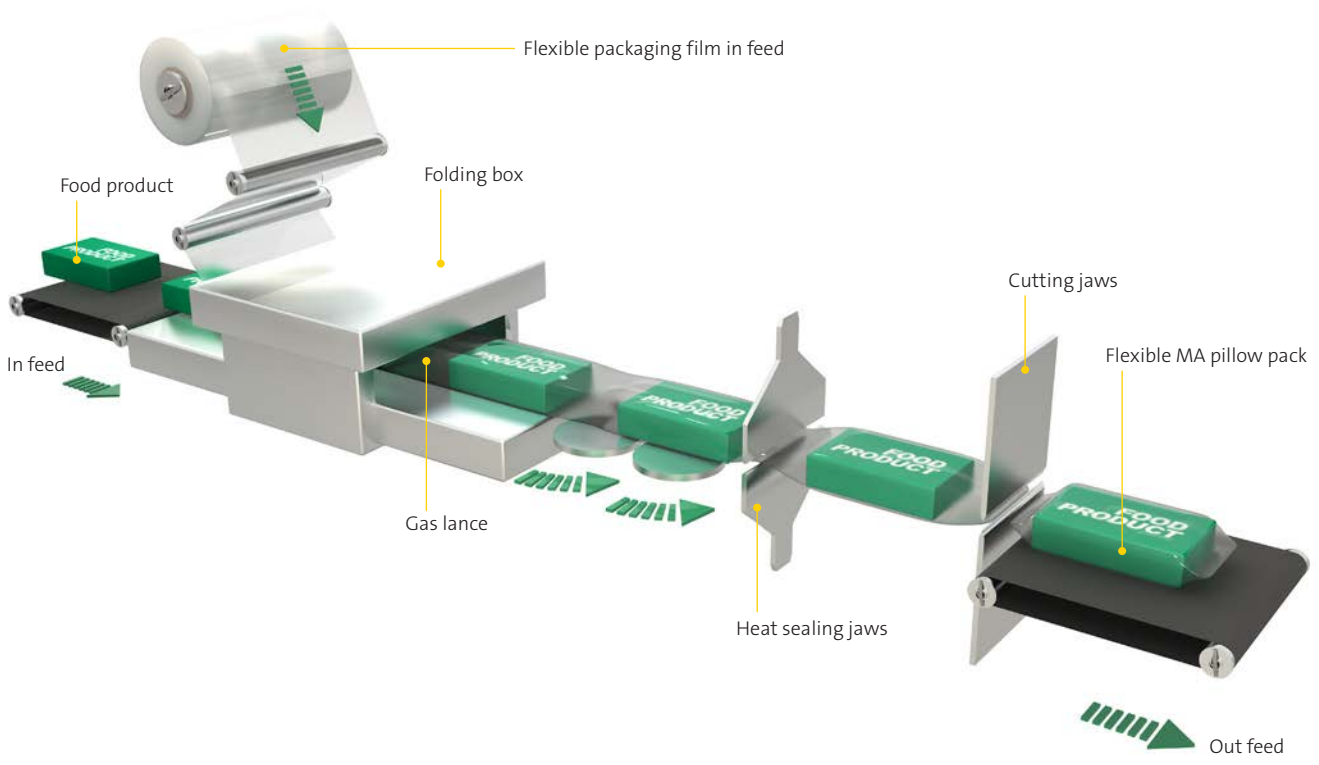


Thermoform-fill-seal (TFFS)

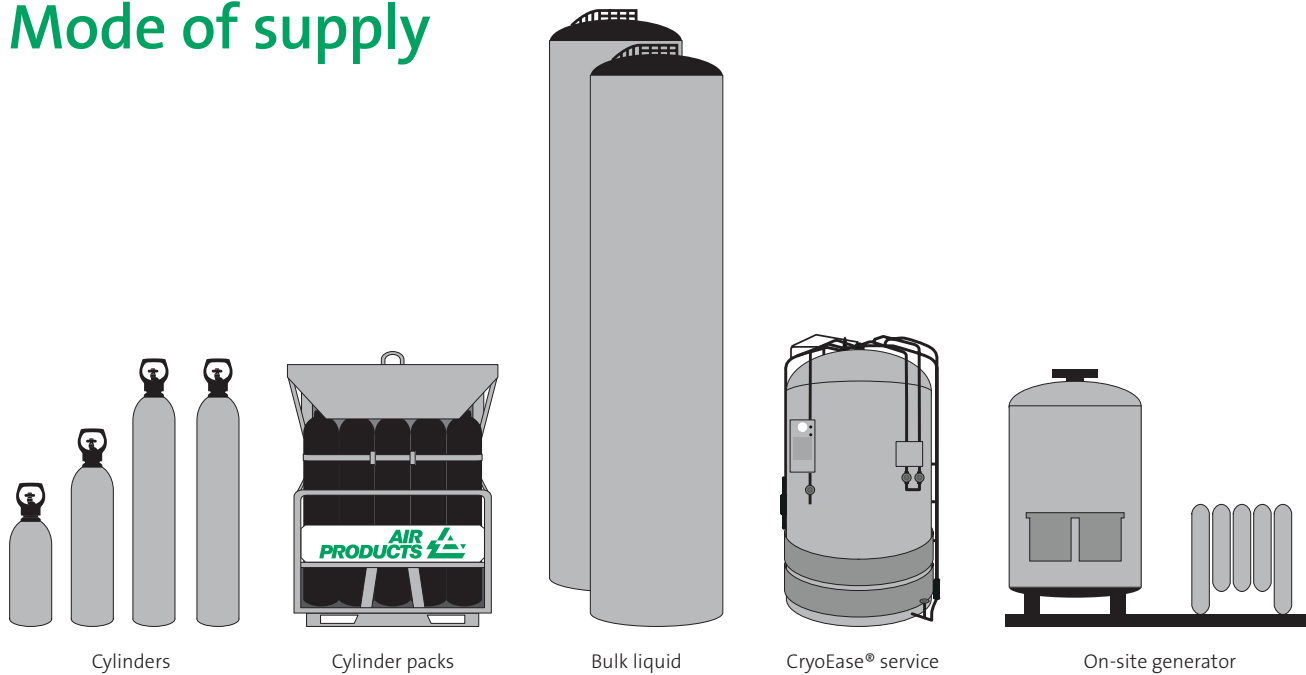


For over **60 years**, Air Products has been a trusted supplier to the food industry in the UK and Ireland, supplying gases, equipment and innovation in MAP gases.

Horizontal form-fill-seal (HFFS)



Mode of supply



Quality and safety as standard, with full traceability

Each Freshline® cylinder has full traceability through a unique batch number placed on the cylinder which allows for it to be traced back to the Air Products depot where it was filled.

Quality Pledge

Through a strict regime of internally and externally audited management systems, our gases meet and often exceed national and EU requirements for food quality, hygiene and traceability.

All of Air Products' European operating groups are certified to ISO 9001, which includes a documented HACCP ensuring that there are sufficient critical control points in the production and distribution process to avoid contamination of gases.

Campden BRI
food and drink innovation

We are members
of Campden BRI
and the Processing &
Packaging Machinery
Association (PPMA)

PPMA
Processing & Packaging
Machinery Association



The system incorporates compliance with the following EU Regulations:

- Food Safety – including Regulation (EC) 178/2002
- Food Hygiene – including Regulation (EC) 852/2004
- Food Additives – including Regulation (EC) 1333/2008 and (EU) 231/2012
- Materials in Contact with Food – including Regulation (EC) 1935/2004

Freshline® Aroma MAP™ delivers an enhanced customer experience

Recognising the powerful tie between our sense of smell and emotional attachment has led our R&D team to develop the Freshline® Aroma MAP™ system.

The first innovation in Modified Atmosphere Packaging (MAP) for many years, the Freshline® Aroma MAP™ system vaporises natural aromas, such as essential oils, into food packaging at the same time as the MAP gas. When the customer opens the packaging, the aroma is released, enhancing their sensory experience and encouraging them to build a positive association with the product or brand they are consuming.

From a technical point of view, the equipment needed to achieve this is easily integrated into existing

production and packaging lines, and requires only a minor modification to an existing MAP production line. One important effect of using essential oils in the MAP process is that some of them have anti-microbial properties. Early trials have shown that the properties of some essential oils can further extend shelf life. By the same token, the essential oils can be used in place of other preservatives to maintain the same shelf life. With the drive towards 'clean label' ingredients, the ability to reduce

chemical preservatives by replacing them with a natural anti-microbial will be an important selling point for some brands.





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