



Freshline[®] Meat Processing Technologies

Expert solutions for freezing, chilling and packaging

The use of food gases is a practice that is becoming more and more common in the meat sector. In order to improve production processes and guarantee quality, the meat industries are looking for methods that allow high quality products to be obtained by using

highly technical production processes. The gases supplied by Air Products meet the highest quality standards and are fully compliant with all relevant EU and local food legislation. We supply a certificate of conformity with every delivery of food grade gases.



Cryogenic Freezing

Cryogenic freezing is when liquid nitrogen or carbon dioxide is used to freeze different types of meat. In industrial meat processes Cryogenic freezing has considerable advantages such as:

- Significant reduction in freezing time
- Reduction in weight loss caused by dehydration
- Reduction in enzyme and oxidative deterioration
- Increase in quality and improvement in the texture of the meat
- Reduction in the size of the water crystals
- Microbial stability
- Improvements in the appearance and colour of the meat
- High freezing speed
- Flexibility in production
- Low financial investment
- Reduction in space taken up by the equipment

The Air Products Freshline® team has considerable knowledge of the use of gas-based technology in the meat sector. By performing audits of your process they will work with you to develop the best solution for each production requirement.



The Freshline® TRS tunnel freezer

Applications and equipment

Freshline® QF: The Freshline® QF tunnel freezer allows the freezing of a very broad range of products of between 100 to 3,000kg/h.

Freshline® TRS: To meet the growing use of high speed cutters the TRS tunnel freezer was specially designed for continuous crust chilling, both of cooked and fresh products prior to slicing or filleting. The tunnel takes up a small amount of space and reaches production capacities of up to 1200kg/h.

Freshline® Mixer: By injecting nitrogen into a specially designed mixer, meat products can be mixed and chilled evenly without the risk of clumping. With a small footprint, production levels of between 1200kg/h and 2700kg/h can be achieved.

Freshline® Tumbler: A coating technology ideally suited for the high value prepared meals sector which enables meat products to be coated with a high percentage of sauces. This system is

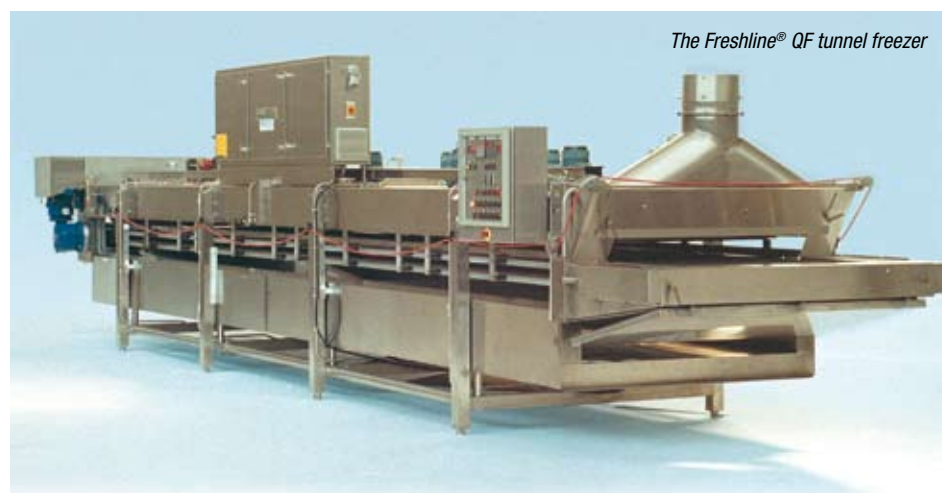
suitable for production rates of up to 1200kg/h.

Freshline® Liquid Nitrogen (LIN) injection system: A controlled temperature system which enables the even cooling of meat products in preparation for the ideal texture to be formed and further processed.

Freshline® Batch: A freezer or chilling unit for pieces of meat and pre-cooked dishes specifically designed for freezing and/or ultra-fast refrigeration, using nitrogen as a refrigeration agent.

Freshline® VT: A high performance tunnel which allows you to freeze or chill any type of food (fish, meat, birds, fruit, pastry...) doubling production and using the minimum amount of space.

Freshline® Rotary: Equipment especially designed for IQF freezing. Furthermore, there are different special types of equipment for this type of freezing.



The Freshline® QF tunnel freezer

Slices of cold meats and fresh meat fillets

The current market demand is directed at an increase in the quantity of pre-prepared products. This is particularly the case in the cold meats category.

In this situation, the industries preparing them are obliged to present their products in trays with the food sliced up, ready to be eaten or to be put into a sandwich.

The preparation of these products, mainly bacon, cooked ham, bologna sausages, etc., is very important as the slicing machines need to be robust.

It is the same with the filleting of fresh meat. Air Products has developed a technique that uses cryogenic crust freezing for optimum working conditions so that the slices or fillets have a better visual appearance and wastage is kept to a minimum.



The improvements that this technique provides to the output and the quality of the product are more than evident:

- Wastage through dehydration is reduced
- Slices or fillets are visually more attractive
- All cuts are homogenised
- Time to refrigerate is significantly reduced
- The number of damaged slices is reduced
- Slices/fillets are produced continuously
- Costs are competitive
- Refrigeration time is reduced

A large quantity of meat is required to produce hamburgers, meatballs and other products that are made out of minced meat. This factor has led to the creation of mincing machines that are capable of handling a larger volume and capacity. The heat generated by these machines leads to fat smears and because of the high temperature, the amount of bacteria increases and consequently the quality of the product is affected. Currently this problem is being solved by adding frozen meat, but the results are not always reliable. On the one hand, the quality of the minced meat is considerably reduced because the frozen meat does not provide enough cold to even out the temperature. Furthermore, this practice increases the risk of the blades breaking, the operational side of the production is reduced and there are significant losses due to the amount of time the meat is frozen for.



In collaboration with the meat industry, Air Products has designed automatic refrigeration systems that inject and dose liquid nitrogen into the mixing or mincing machine itself by using a special temperature control system.

By controlling the temperature of the meat itself, the nitrogen injection is regulated providing the cold that is required at all times and adjusting the gas consumption to the requirements of the process.

The Freshline® temperature control system provides:

- Improvements in the quality of the minced meat – the fat is not broken up and the cuts are regular and even
- The mixes are more even as the time taken to make them does not need to be shortened as the temperature increases
- Bacteria are inhibited by changing the contact atmosphere of the meat (no oxygen)
- The appearance of the meat is improved by avoiding the formation of metamyoglobin, resulting from excessive exposure to oxygen in the air.

Extending shelf-life using Modified Atmosphere Packaging

The two principal spoilage mechanisms affecting the shelf-life of meats are microbial growth and in red meats, oxidation of the red oxymyoglobin pigment. By utilising the optimum mixture of oxygen, carbon dioxide and nitrogen gases in the packaging of these meat products, shelf-life can be extended by multiple days. Air Products offers a range of pure and premixed food grade gases for the food industry. These gases can be supplied in a range of forms including cylinders, cylinder packs, small bulk tanks, large bulk tanks, generators and onsite supply systems. In addition, our Freshline® team, equipped with analysis equipment, are available to undertake process trials to ensure you find the perfect gas mixture for your product.



Food quality and traceability pledge

Air Products and its subsidiaries have been providing gas-based equipment, services and products to the food and beverage industry globally for more than 40 years. Our portfolio is comprehensive and offers flexible solutions for freezing and chilling of food, modified atmosphere packaging, beverage applications and waste water treatment. Through a strict regime of internally and externally audited management systems, our gases meet and often exceed the Government and EU requirements for food quality and traceability. All of our gas cylinders are supplied to the highest specification and include tamper-proof shrink wrap systems to prevent contamination complete with a batch numbered certificate of conformity for traceability. For added security they are painted a lilac-blue colour to allow them to be easily differentiated from industrial products.

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