

**Opteon™ XL20 offering
energy efficiency
and environmental
sustainability in the
meat processing
industry: the F.B.M
and Baglioni project.**

F.B.M. MEAT PROCESSING



Opteon™

THE COMPANY

F.B.M. Meat Processing S.r.l was founded in the green Tuscan hills in 1985 from the union of five people joined in a passion for gastronomy and experience in meat processing.

Today it is a leading company in the meat sector, operating both regionally and nationally, offering their customers a complete range of fresh meats and elaborate products made by hand, following refined, healthy and genuine recipes to rediscover the ancient flavours of the past.

All products are processed exclusively at the company facility using fresh, top-quality ingredients, carefully selected at their origin to ensure maximum reliability.

The clientele is made up of traditional butchers, caterers, canteens, chain stores and large-scale distribution.

With time and the success, F.B.M has become a large company in the sector, operating in the trade of livestock, in slaughtering, processing and in wholesale of beef, pork, horse, sheep, goat and poultry, national and foreign, fresh and frozen and in the production of processed meat products, both ready-to-cook and precooked.

Recently renovated and expanded, the company has a new structure, and a state-of-the-art premises and equipment that allow it to guarantee rigorous product hygiene and consistent quality control, thanks also to a strict and stringent HACCP [Hazard Analysis Critical Control Point] plan.

PROCESSING

All fresh meat cutting, deboning and portioning processes are carried out at the new plant in Vicarello (LI). For the maturation process, the finest meats are sent to the dedicated refrigeration room.

The elaborated products, from the simplest hamburgers to the lines of gluten-free breads and the rolls stuffed with the best fillings, are made entirely by hand by expert workers and are offered both in ready-to-cook and precooked versions, both using traditional and sous vide methods.

The products are sold in bulk, vacuum-packed, in a protective atmosphere or otherwise with skin, both fresh and frozen.



CUSTOMER REQUIREMENTS



The EU F-Gas Regulation 517/2014 has initiated a path to reduce the use of refrigerant gases with a high global warming potential (GWP) within the European Union. HFC-based refrigerants (hydrofluorocarbons) such as R-404A and R-507, due to their high GWP, are subject to limitations for use in new plants and will be less and less available for the maintenance of existing systems. More and more, companies are looking for a long-term solution for their refrigeration systems that can guarantee the same performance and ease of use.

Opteon™ XL20 (R-454C) is a blend of HFOs (hydrofluoroolefins) capable of providing an adequate cooling performance with a

GWP of less than 150, 96% lower than that of R-404A. This is why it is proposed as a sustainable alternative in terms of CO₂ equivalent emissions and can be used in absolute safety according to the EN 378 standard.

PROJECT OBJECTIVE

The purpose was to leverage the benefits of an innovative system designed using a low GWP refrigerant: Opteon™ XL20 (R-454C).

- Reduction of direct CO₂ emissions equivalent to 96% compared to R-404A
- Improvement of brand reputation and environmental credentials
- Repeatability of the installation
- Performance monitoring



SITE AND PRODUCTION PROCESS

To comply with the F-Gas Regulation and minimize emissions, the new site, consisting of a production area of 1500 m² - 300 m² of which is dedicated to offices - has been designed to benefit from the excellent performance and very low GWP of Opteon™ XL20.

The new plant has dedicated a 100 m³ meat maturation refrigeration room with a volume of 5 x 5 x 4 m, a set temperature of 2°C and a variable humidity of 85 - 95%.

Maturation is a technical process typical of good butchers, where meat is matured in environments with strictly controlled temperature, humidity, pH and other parameters to soften the fibers and thereby make them more tender. This process involves very specific procedures and rules to be followed for complete safety. The controlled process conditions comprise low temperature, high humidity and correct ventilation to gradually transform the muscle.

An example: to get the best from a famous cut such as La Costata Alla Fiorentina [Florentine thick T-bone], an average of 20 to 30 days of whole loin maturation is required, at a temperature of -1°C/+2°C with a relative humidity of 85-90 %.

DESCRIPTION OF THE MAIN DEVICES

The system consists of:

Refrigerant gas:

- Opteon™ XL20 (R-454C)
- Load: 8 kg
- GWP: 148
- CO₂ ton eq: 1.18
- Sizing carried out according to: EN 378
- Fluid PED Group 1, system in PED II category

No. 1 Condensing unit with box composed of:

- semi-hermetic compressor (Dorin: H405CC)
- air condenser (LU-VE: LMC3N 1531VEC)
- liquid receiver (Frigomec)
- suitably sized overpressure protection devices (Danfoss)
- power panel set in an insulated housing, to avoid any type of contact with potential leakage of refrigerant gas in hazard class Group 1, defined as moderately flammable (A2L).

No. 2 Double flow ventilated evaporators (LU-VE SFHD 822 E4 SPEC ED/R):

- helical fans
- safety grills
- electric defrosting, using a battery of resistors installed inside the evaporator
- thermostatic expansion valve

Elements of prevention of residual risks due to the presence of moderately flammable refrigerant (A2L):

- Fire/explosion hazard signs
- No smoking or use of open flames
- Compliance with UNI EN 378, especially for materials that are allowed to be stored near the equipment
- Use of equipment suitable for A2L
- After 20 minutes of ventilation, direct check for leaks before operations
- Placement of a 6 kg powder fire extinguisher near the maintenance site

Operating conditions:

- Cooling capacity: 9.96 kW
- Nominal power: 3.58 kW
- Evaporating temperature: -10°C
- Condensing temperature: $+45^{\circ}\text{C}$
- Operating temperature: $+2^{\circ}\text{C}$



DISCUSSION AND CONCLUSIONS

Baglioni S.r.l., in charge of supplying and installing the new system, based on their decades of experience had no difficulty in adapting the risk analysis to the use of an A2L category refrigerant, and in designing the unit, using components certified for **Opteon™ XL20 (R-454C)**. The installation phase did not involve significant complexities compared to an ordinary system. This experience with a high-performance and very low GWP solution gives the company an advantage over competition, towards customers who are attentive to environmental aspects and to the long-term sustainability of their investments.

Initial doubts about the possible difficulties in handling the glide turned out to be unfounded. The **LU-VE** condenser, the **Dorin** compressor and the **Danfoss** control valves have been appropriately selected to manage the parameters necessary for correct and precise system operation with a moderate glide refrigerant (less than 5 K).

The system has been operating perfectly from the first day of start-up, without problems and to the satisfaction of the user. In addition, the performance of the system will be monitored with the Wi-ref system for a systematic check of system status and for preventive maintenance.



Opteon™ XL20 (R-454C) has proven to be an excellent replacement for R-404A, suitable for ensuring the high performance required for the operation of production processes, while reducing direct emissions into the environment by 96%.

THE CUSTOMER'S VOICE

Emiliano Baglioni, director of Baglioni S.r.l., designed and built the low GWP unit with Opteon™ XL20 (R-454C) in order to be able to offer their customers a cutting-edge solution with reduced impact on global warming, performant in the medium and long term. The properties of the refrigerant are such that make it easy to use compared to other solutions currently in use.

Mr. Baglioni commented: "Working on this project has allowed us to dissolve the doubts related to the use of moderately flammable HFOs (A2L). The design of the machine is very similar to the systems we've been working on in recent years. The reduced glide has generated no complications and all of the components are available on the market certified by the manufacturer. The risk analysis was carried out carefully and without difficulty. This experience opens our company up to new job opportunities and allows us to offer our customers a sustainable and long-term solution."

Giacomo Montelisciani, the end customer, declared that he relied on the experience of his trusted installer, and believed in his proposal for innovation and environmental sustainability.

Mr. Montelisciani commented: "Our priority is that our products maintain the highest quality standards and that our processes are environmentally friendly."

COMPANIES THAT CONTRIBUTED TO THE PROJECT

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Baglioni S.r.l.

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