



Sprayed Güntner condenser for R-723 compressor

Western Slovakia's largest ammonia methyl ether plant (R-723) supplying cold and, at the same time, hot water is installed on top of the roof of the poultry production facility HYZA in Topolčany. It is only non-usable heat that is dissipated to the surroundings by a Güntner dry cooler V-SHAPE Vario, type GFD, via a water/glycol circuit. Five Güntner CUBIC Vario air coolers were installed for the cooling of expedition rooms.

The Slovakian company HYZA is one of the top European producers of poultry and poultry products. The company is part of the Czech AGROFERT Group and operates, according to the company, Middle Europe's most modern plant for poultry production in the Western Slovakian city of Topočany with more than 900 employees.

Poultry processed at this plant comes from contracted farms and is distributed in Central Europe as fresh or frozen product – either as chickens ready-to-cook and ready to be served respectively, or in the form of different meat preparations in a variety of flavours. The plant in Topočany processes 100,000 chickens every day and delivers the products to retailers within 12 to 24 hours.



Overview

Business line:	Industrial
Application:	Meat product cooling
Country/Region:	Slovakia/Topočany
Fluid:	R-723 / 34 % water/glycol mixture
Product:	Güntner V-SHAPE Vario, type GFD Güntner CUBIC Vario, type GGHF

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▲ The spraying of the Güntner V-SHAPE Vario, type GFD, automatically activates at an ambient temperature of 27 °C and thus allows for cooling the ethylene glycol down to a lower temperature level than that of the ambient temperature.



▲ The enclosure for the additional decentralised central cooling facility and the condensers needed to be located, for lack of space, on the roof exactly above the production.

R-723 cold and heat compound system

The poultry manufacturer already operated an NH₃ refrigerating plant with direct expansion so that the management is familiar with the advantages and the handling of the refrigerant ammonia. The plant's expansion, however, called for additional cooling demand for cooling expedition rooms.

At the same time, the heat demand for heating the service water increased, and an economically efficient and environmentally friendly technology with a low CO₂ footprint, a low GWP (Global Warming Potential) and ODP (Ozon Depletion Potential) was required. This is why the plant is operated with the refrigerant mixture R-723.

The plant can supply 135 kW of heat and 180 kW of cold at the same time, and transfers it to the respective heat and cold water circuits. The Slovakian refrigeration engineer ABC Foodmachinery s.r.o. planned and installed this application.

The R-723 refrigerating unit with a refrigerant charge of only 7.5 kg uses the electrical energy consumed for the drive of the compressors in „both directions“. This way, 5.2 kW of heat and 4.3 kW of cold are produced per 1 kW of electrical energy at the same time. The evaporating temperature is -10 °C while the condensing temperature is +45 °C. The waste heat of hot gas is used for defrosting.

What made the decision in favour of this plant engineering easy for the operators is, above all, the high energy efficiency of the technology and the relating low life cycle costs. But also planning security and legal sustainability (no restrictions with regard to the F-Gas Regulation) were key factors.

Installation during operation

The enclosure for the additional decentralised central cooling facility and the condensers needed to be located, for lack of space, on the roof exactly above the production. For this, it was required to statically reinforce the roof construction so that it can absorb the additional loads. The roof construction was initially designed only for snow loads during winter time.

The installation and connection works and the commissioning were carried out during operation, which required precise scheduling. The ceiling opening to the intermediate storey above the manufacturing room and the cable routing through the ceiling to the processing rooms were particularly challenging. Thanks to the experienced employees of ABC Foodmachinery s.r.o., the operation was not interrupted at all.

Ammonia methyl ether (R-723)

Ammonia methyl ether (R-723) is a refrigerant mixture that is particularly suitable for smaller capacity requirements up to 300 kW. It consists of an ammonia mass fraction of 60 per cent and a dimethyl ether mass fraction of 40 per cent and has an ODP of 0 as well as a GWP of 8. There are no shifts in concentration during evaporation and condensation so that the refrigerant blend can be used in the same way as a pure refrigerant mixture.

Compared with ammonia, it has a greater refrigerating effect per unit of swept volume (150 % of the circumferential volume flow of the vapour phase compared to NH₃) at the same refrigerant charge, and the final discharge temperature is lower by about 15 K. The advantage for the operator is that the refrigerating capacity is significantly greater and that he or she can use air-cooled condensers.

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Güntner V-SHAPE Vario, type GFD

The external cold/heat rack system is installed in a small container on top of the roof. The refrigerant flows only inside this enclosure, and heat transfer to the cold and heat water/glycol circuits takes place via plate heat exchangers. The non-usable heat is dissipated to the environment by a Güntner V-SHAPE Vario unit of type GFD (250 kW dry cooling capacity) located directly next to the enclosure via a 30 % monoethylene glycol circuit that serves as condenser this way.

The Güntner Motor Management adjusts the speed of the four EC fans, and the Güntner Hydro Management controls the water consumption of the automatic and hygiene-compliant spraying. The data are adjusted to the most efficient operation via Profibus communication protocol. Spraying automatically activates at an air temperature of 27 °C. The Güntner V-SHAPE Vario GFD unit additionally meets the efficiency requirements of the ErP Directive 2009/125/EC.

Cooling of chicken using Güntner CUBIC Vario air coolers

HYZA achieves a very high microbiological quality of its products by means of air cooling. Instead of the classic and frequently problematic dip tank for cooling, the company relies on five high efficiency speed-controlled Güntner CUBIC Vario air coolers of type GGHF for the cooling of expedition rooms. These ceiling-mounted units cool the air to 2 °C. The air coolers stand out, on the one hand, thanks to their HACCP-ready design certified by TÜV Süd and, on the other hand, thanks to their great air throw preventing unfavourable heat and humidity pockets right from the start.

The Güntner CUBIC Vario air coolers are supplied via a 34 % MPG circuit (monopropylene glycol) as secondary coolant (inlet -8 °C, outlet -4 °C). These coolers allow for exactly adjusting the relative humidity in the cold room so that losses caused by desiccation are reduced to a minimum. The poultry production is, in line with the high hygiene requirement of the plant, certified according to the standards of the Global Food Safety Initiative and to the European standards IFS, BRC und ISO 9001:2009.