



Climate-friendly and future-proof:

Refrigeration concept for poultry
farm combines low-GWP
refrigerants and waste heat recovery



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“Opteon™ XL20 (R-454C) optimally integrated” - this is how you could sum up the new refrigeration system of an austrian poultry farm. AMT Kältetechnik GmbH has replaced 27 individual refrigeration units with a sophisticated system solution - a modern approach based on the latest technology. It uses the climate-friendly refrigerant Opteon™ XL20 (R-454C). The system also includes a heat recovery system. The refrigeration unit thus meets all the requirements of the F-Gas Regulation and goes well beyond the specifications in terms of sustainability and climate protection.

In the inventory analysis at the poultry farm, AMT's refrigeration experts counted eight MT cooling loads, ten AC loads, three LT loads (one redundant), and one freezer shock room. This situation presented many opportunities for the modernization of their refrigeration technology. Together with the customer, AMT decided on an integrated and especially energy-efficient solution:

Opteon™ XL20 (R-454C) for Medium temperature (MT) application

For the medium temperature area and air conditioning, AMT installed two brine circuits to supply the individual cooling loads instead of individual units. These are a plus cooling circuit (brine -10/-5 °C) and an air conditioning circuit (brine -2/+3 °C). For refrigeration, there are three chillers with R-454C refrigerant in each circuit.

R-454C is a low-GWP refrigerant of the latest generation, which has a very low global warming potential of 148. This means the refrigerant is not affected by the F-Gas Regulation bans and is particularly future-proof. Refrigerants with values above 150 GWP points will be affected by supply bottlenecks and price increases in the coming years due to the prescribed quotas. In contrast, good availability is still expected for R-454C. Another advantage: R-454C is assigned to safety class A2L and is considered “mildly flammable”. According to DIN EN 378-1, there is no charge restriction for outdoor installations (location classification III), regardless of the access area.

R-744 for low temperature application

For freezing, AMT Kältetechnik has chosen the refrigerant R-744/CO₂. Thanks to the existing brine circuit in the air conditioning area, a subcritical CO₂ refrigeration system could be chosen (cascade). The units are each connected to the brine circuit via a plate heat exchanger and ensure the condensation of the CO₂ freezer units. Subcritical operation ensures better energy efficiency of the CO₂ units. In addition, there is no need to install another secondary circuit due to the existing brine circuit. Additional purchase costs can be avoided - another big advantage compared to a single installation.



Intelligent waste heat recovery

The sustainable concept is topped off with heat recovery. To make optimal use of the 144 kW in full-load operation, a third brine circuit was installed to absorb the waste heat. Energy is used for office heating, hot water production and auxiliary heating coils of the AC cooling units, while actively dehumidifying and defrosting the freezer evaporators of the CO₂ cooling units. Emissions that would otherwise be generated by electric defrosting heaters, heating coils or fossil-fuel driven heaters are avoided. This makes the already energy-efficient R-454C chillers even more attractive and, at the same time, improves the energy balance of the CO₂ refrigerant units - a remarkably environmentally friendly overall concept.

The combination of technologies is what makes the concept special. A well-thought-out system solution is now in use, where 27 individual refrigerant units were previously used. The environmentally friendly refrigerants R-454C and R-744 have an impressively low GWP. An additional bonus in terms of climate protection is the reduction of emissions through low energy consumption. The intelligent use of waste heat ensures particularly energy-efficient operation - this is possible because AMT Kältetechnik has taken an overall view of customer requirements. Sustainable concepts such as these go a long way toward achieving climate goals.

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