



# Vegetables for the region of Moscow: Cooling efficient at high humidity

In its new central vegetable warehouse in the region of Moscow, the wholesaler Moskovskij Kombinat established cold stores which are individually adjustable in terms of room temperature and relative humidity. Güntner air coolers and Güntner fluid coolers/dry coolers provide a consistently high quality of the fresh goods and an efficient heat dissipation on the 20.000 m<sup>2</sup> storage space.

Moskovskij Kombinat ist particularly proud of the quality of its fresh vegetables, salads and herbs as not only Russian but also international quality standards are adhered to. The goods are carefully graded, packed and conserved respectively so that customers can be supplied with excellent products which are also notable for their good taste.

The company has produced, stored and distributed vegetables from a single source for 43 years. Tomatoes, cucumbers, peppers, aubergines, mushrooms, salads and herbs (the latter in pots) are checked and cultivated in an environmentally friendly way with modern methods on an area of 115 hectares in total.

The logistics hub of the Moscow-based vegetable wholesaler is the new vegetable and fruit cold store in Moskovskij. From there, the company supplies

## Overview:

Line of business:	Industrial Refrigeration
Application:	Fruit and vegetable cooling
Country/city:	Russia/Moscow
Fluid:	Water/glycol mixture, R134a
Product:	GACA air cooler DGN air cooler GVD condenser GFD fluid cooler

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Güntner AGRI Application GACA coolers with blow-through fans and deflectors provide a very low dT inside the storage rooms. This ensures the dehumidification of the refrigerated goods is as low as possible.



In winter, the whole waste heat of the compressors is used for heating, and during summer, the heat which is not needed is dissipated by means of a Güntner V-SHAPE Vario GVD condenser as well as three Güntner V-SHAPE Vario GFD fluid coolers/dry coolers.

the large distributors with its own logistics fleet. With the new construction of the central warehouse, Moskovskij Agrarholding responded to the increasing demands of the market and implemented the building project with the refrigeration engineering company Refengineering, Khimki.

### High demands on refrigeration engineering

In the continental climate of the Moscow region, the storage of Moskovskij Kombinat has to be cooled down not only during the hot summer months. Three energy-efficient screw compressors provide a total cooling capacity of about 2,900 kW. The pure R134a refrigerant is used only in the three primary circuits of the machine room.

The refrigerating capacity and the heat capacity respectively is transferred via thermowave plate heat exchangers to water/glycol circuits which, in turn, individually supply all the working areas with the required flow temperature.

In order to reduce the filling quantity of the refrigerants, the non-reusable heat is dissipated to the environment via a water/glycol circuit. The water/glycol piping is entirely made of plastic as this material lasts over 50 years as opposed to steel.

Frequency converters control the capacity of the motors of all fans, dry coolers and pumps in a highly efficient way. Furthermore, water/glycol circuits feature an air volume flow control so that up to 75 per cent of the power can be saved in pump operation, compared to standard technology.

### High level of heat input into the storage

Heat needs to be dissipated from the manufacturing process, the technical premises and the storage rooms throughout the year. Not only the staff is a source for heat energy in the storage – the goods which are delivered relatively warm also produce respiratory heat.

Directly after their delivery, the sensitive goods are pre-cooled by Moskovskij Agroholding and it is only in a second step that they are, depending on the product, cooled down to the final temperature. This is because vegetables, salads and herbs have very specific requirements with regard to humidity and temperature to remain fresh and tasty.

Vegetables, salads and herbs are stored in storage chambers at temperatures of between 0 °C and 12 °C and at a relative humidity of between 75 and 95 per cent. Two low-temperature storage rooms are maintained at a temperature of -18 °C.

25 Güntner dual discharge DGN air coolers and 34 Güntner GACA air coolers in total provide the appropriate temperature and humidity in the storage and the production rooms.

### Compressor heat used for heating

Throughout the year, the air coolers require defrosting. During winter time, some operating zones, the supply air, the air curtain and the floor heating are additionally heated. An automatic control supplies the individual rooms with a hot or cold water/glycol mixture.

The hot gas of the refrigerating machines serves as energy source for the hot water circuit. In winter, the whole waste heat of the compressors is used for heating, and during summer, the heat which is not needed is dissipated by

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Dual discharge Güntner DUAL Vario DGN coolers with slowly rotating fans effectively prevent the danger of product dehydration in the corridors and production rooms as the coolers ensure draught-free air distribution.

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The heat exchangers are equipped with the tried and tested Güntner floating coil principle. Thanks to the fact that the copper tubes and tube sheets do not have any contact, they can withstand also extreme temperature fluctuations.

### Relative humidity of 100 per cent for vegetables

As for the selection of the coolers, the quality of the vegetables was more important than energy efficiency. In the storage rooms, 34 Güntner AGRI Application GACA units with blow-through fans and deflectors provide a very low dT. This ensures the dehumidification of the refrigerated goods is as low as possible. The relative humidity of the exhaust air is 100 per cent. The operating principle of the fans effectively prevents areas with high air velocity.

Dual discharge Güntner DUAL Vario DGN coolers with slowly rotating fans also effectively prevent the danger of product dehydration outside the storage rooms. All in all, 25 units ensure draught-free air distribution there.

The central control automates the amount of water/glycol directed at each cooler. In this way, the condensation of humidity and the relative humidity is controlled. Low temperatures of the water/glycol mixture dehumidify the room air considerably while higher temperatures result in a lower dehumidification.