Mega Cold Storage House in the United Arab Emirates

Line of Business:	Industrial Refrigeration
Application:	Fruit and Vegetable Cooling
Country / City:	United Arab Emirates / Sharjah
Fluid:	NH_3
Product:	Ceiling unit cooler DHN, Wall/ ceiling unit cooler GHN, Ceiling unit cooler GDS, Ceiling unit cooler GHS

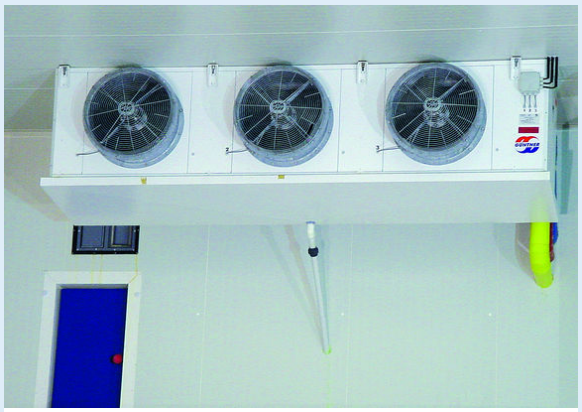
The Arjomandi Group of Companies (AGC), founded in 1956, has been producing and distributing fruit and vegetables in the Middle East for decades and in 2002 was awarded the prize as “Exporter of the year” by Mohammed Khatam, President of the Department of Agriculture. AGC has many plantations, distribution offices and cold stores in Teheran and Shiraz in Iran. Because of these extensive experiences in the production of fruit and vegetables, cold storage and distribution in large sections of Iran and Iraq, the plan was to expand the delivery of fruit and vegetables into the United Arab Emirates, parts of Saudi Arabia and Oman as well. The location in Sharjah proved to be an excellent base for the transshipment and storage of the sensitive produce.

As a seaport Sharjah has direct access to the Arabian Sea and therefore to all Iranian ports, from which the fruit and vegetable production is shipped to the Middle East. Due to an excellently maintained road network all important cities are easily reached, which means that the Arabian Peninsula is well supplied and has good infrastructure. It was therefore a simple logical conclusion that the AGC's no. 1 distribution point should be built here. With a distribution area more than twice the size of Germany, there was a need on the Arabian Peninsula for a mega cold store with the appropriate refrigeration plant and high-quality evaporation technology for industrial refrigeration.

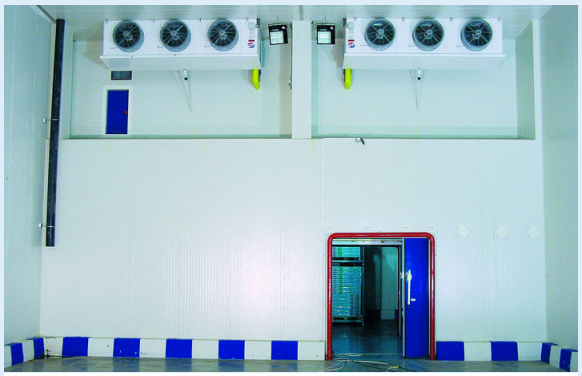
The large goods transshipment point with three stainless steel evaporative condensers on the roofed delivery zone

„You name it, we cool it!"

With this motto ZAV Company LTD (ZAVCO) has for many years been taking up every challenge in the field of refrigeration technology and in 2002 they got the contract from AGC to install the refrigeration plant for this large-scale project on the edge of the desert. Not for nothing is ZAVCO among the most qualified refrigeration plant constructors in the Middle East, because, as experienced specialists in commercial and industrial refrigeration technology, they naturally trust only high-quality products from leading manufacturers in the international refrigeration industry. So it's easy to understand why for them Güntner products from Fürstenfeldbruck are a part of every project! The high quality of the sensitive goods and the extreme temperatures of the Arabian desert demanded a robust refrigeration plant of the highest technical level and a sophisticated controller to regulate the constant room temperatures and air humidities. For economic and energy reasons industrial refrigeration plants of this size are operated with a flooded ammonia pump system.



S-GHS 066D: as an option with more powerful fan motors



Two S-GHS 066D/38s at the dizzy height of around 8.5 m with maintenance gangway under the condensers

Aircoolers from Güntner

The project included a total of 55 cold rooms with 136 NH_3 aircoolers from the GHS and GDS series. The aircooler coils were supplied in the standard steel version hot-dip galvanized at 450 °C and in the industrial hot-dip galvanized steel version and with RAL 9003 paintwork as requested. All aircoolers were fitted in the factory with pipework for hot gas defrosting in the drip tray, non-return valve, a drip tray insulated against condensation forming on the outside and a special anti-rust coating. 36 cold rooms were set up for normal refrigeration, 0 – 2 °C, and 14 cold rooms were designed and installed for multipurpose cooling (normal refrigeration and deep freezing).

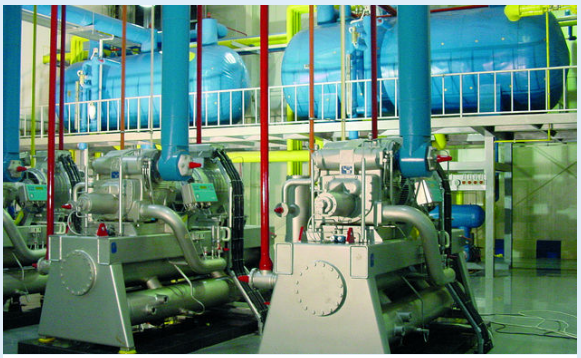
Two GHS 066D/38s lower the temperature in the large delivery and sorting hall to +10 °C

Large separate cool zones were provided specially for ripening bananas and the large packaging and sorting area was laid out for handling more than 1,000 tons of fruit and vegetables daily. For over six months ZAVCO had 10 refrigeration engineers and often more than 15 assistants permanently employed in the field on the building site working together with Milad Engineering (a subsidiary of AGC). Most of the 136 industrial evaporators had to be installed and connected at a height of 8 – 9 metres and electric cables were laid and more than 15 kilometres of steel conduits for condensate, suction and hot gas pipes were installed and welded, entailing the use of lift trucks, large lifting equipment and scaffolding.

Güntner distribution experts and the project team from the Arjomandi Group of Companies in Fürstenfeldbruck

The central refrigeration plant

The heart of the mega cold store is the central refrigeration plant with three high pressure and three low pressure screw compressors from the Danish company York and one high and one low pressure separator working in flooded pump mode. In the top class tiled machine room the six screw compressors each stand on a black marble plinth and are firmly anchored directly to the foundations via vibration dampers. The economic functioning of the whole refrigeration plant was in the foreground during planning and installation, because the circulation of the refrigerant is the optimum solution from the energy point of view. The NH_3 refrigerant is pumped out of the two separators to the evaporators in the various cool zones.



Machine room belonging to the Arjomandi Group of Companies (AGC) in the United Arab Emirates

The evaporators are "driven" flooded and the entire evaporator surface is available for the evaporation process, because, in contrast to expansion valve operation, no part of the surface is needed for superheating. The liquefaction of the NH_3 refrigerant takes place on the nearby delivery zone roof. Here there are three large evaporation condensers, made of stainless steel and seawater-proof, which are supplied with enough water from a specially installed seawater desalination plant near the coast.

As 136 cold stores need defrosting, it was decided that NH_3 should also be used for this process, as there is always enough hot gas available in a refrigeration plant of this size to be able to ensure effective hot gas defrosting at different times.

The defrost cycle

The hot gas is supplied via an insulated hot gas pipe to the evaporators and fed at the evaporator entrance via a solenoid, which opens during the defrosting process, firstly into the insulated drip tray and from here on to the entrance to the evaporator via a non-return valve

installed at the factory. During the defrosting phase the superheated ammonia condenses and defrosts the evaporator. The condensate is taken from the evaporator outlet via a condensate return pipe to the liquid distributor. The closed solenoid in the intake pipe prevents the condensate getting into the low pressure area during the defrosting phase. A non-return valve is built into the condensate return pipe, which prevents liquid NH_3 entering the low pressure side during the cooling phase. Right beside the lavish machine room, which has been built to the highest international standards, is the master display.

Computer-controlled master display with Güntner refrigeration

This marble-tiled control room is also fitted out with a Güntner evaporator, just like the machine room, so that a constant, pleasant room temperature can be guaranteed. All compressors are fitted with York's "Unisab II" control module, linked with the so-called "mastersab control system" of the computer-controlled master display, so that the entire machine room and all its graphically displayed parameters can be monitored, controlled and adjusted from here. As a special feature this control system has been linked with the "profibus network system" developed by Siemens and it is therefore possible for York in Denmark to monitor all compressor parameters and the entire refrigeration plant, etc. and in the event of a failure access it directly.

Connecting passages are cooled with S-GDS 051B/28 double coil evaporators

This forward-looking control of the entire plant makes it possible for specialists in Europe to react within minutes and to be on site within a day in the worst case scenario. The Arjomandi Group has had the very best of experiences with high-class German workmanship from Fürstenfeldbruck. Therefore, it was decided in mid-July 2006, to commission the construction of another 69 high-class evaporators for the expansion of the cold store in Sharjah and 289 high power evaporators with stainless steel pipework and aluminium fins for a new mea cold store project.

The technical requirements were high!

Capacity:		Outside temperatures:	
22.000 tons of chilled goods	0 °C to 2 °C	Dry bulb temperature	44 °C
8.000 tons of refrigerated goods	–25 °C	Wet bulb temperature	31 °C
Bringing in and sorting temperature		10 °C	

20.000 m² cold room floor area with various temperature zones