NEW REFRIGERATION INSTALLATION USING ENGAS NATURAL REFRIGERANTS FOR ELITE FOOD COMPANY (BUILDING ONE) MALAGA INDUSTRIAL AREA PERTH, W.A.

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CONVERSION OF EXISTING REFRIGERATION SYSTEMS FROM R22 DIRECT EXPANSION TO HYDROCARBON REFRIGERANTS AND GLYCOL / WATER SECONDARY CIRCUITS.

MALAGA INDUSTRIAL AREA, PERTH, WA

The existing cold rooms and freezer room were installed some eight years ago, with the Cold Rooms operating at 2 Degrees Celsius, and the Freezer Room at minus 18 Degrees Celsius. The rooms were of normal cold room/freezer room construction, utilizing industry standard refrigeration equipment with direct expansion evaporators and remote (external) condensing units.

The owner, having already benefited from the high efficiency of hydrocarbon refrigerants – wanted these units converted.

However after a full survey, it was felt that, due the size of the rooms, constant foot traffic, integration into the main building etcetera, it would not be practical to carry out a direct chemical refrigerant v hydrocarbon refrigerant conversion.

Therefore a full re-design was carried out with the emphasis on safety. A Glycol Chiller secondary loop system was selected, not only for efficiency, but to ensure a fully safe installation.

PROCEDURE

The existing chemical refrigerant from each system was carefully recovered and stored, the evaporators were removed from the rooms, thermostatic expansion valves were removed from the coil assembly, and the internal piping was carefully flushed. The coil headers were modified to suit chilled water/glycol mixtures.

Interconnecting piping was disconnected from the condensing units, and the pipework was also fully flushed. Any damaged pipe insulation material was replaced.

The evaporators, or fan coil units as they now are after modification were re-installed, and re-connected to the pipe work.

Each condensing unit was re-piped and compact, highly efficient brazed plate heat exchangers (PHE) were fitted. Brazed plate heat exchangers were used because, not only are they extremely efficient and compact, but they also reduce the need for large refrigerant charges.

Water/glycol ‘buffer tanks’ were individually fabricated from high grade stainless steel, and carefully insulated on all surfaces using elastomeric nitrile rubber sheet insulation, with joints and seams fully sealed. Chilled water/glycol pumps were selected to give the optimum flow rates and then integrated to the system. Valves were fitted to allow for accurate flow rate control.

The original pipework was modified to fit to the new buffer tank, PHE, pump configuration. Sealed thermostats and pressure switches were fitted to protect the system from icing up in case of pump failure.

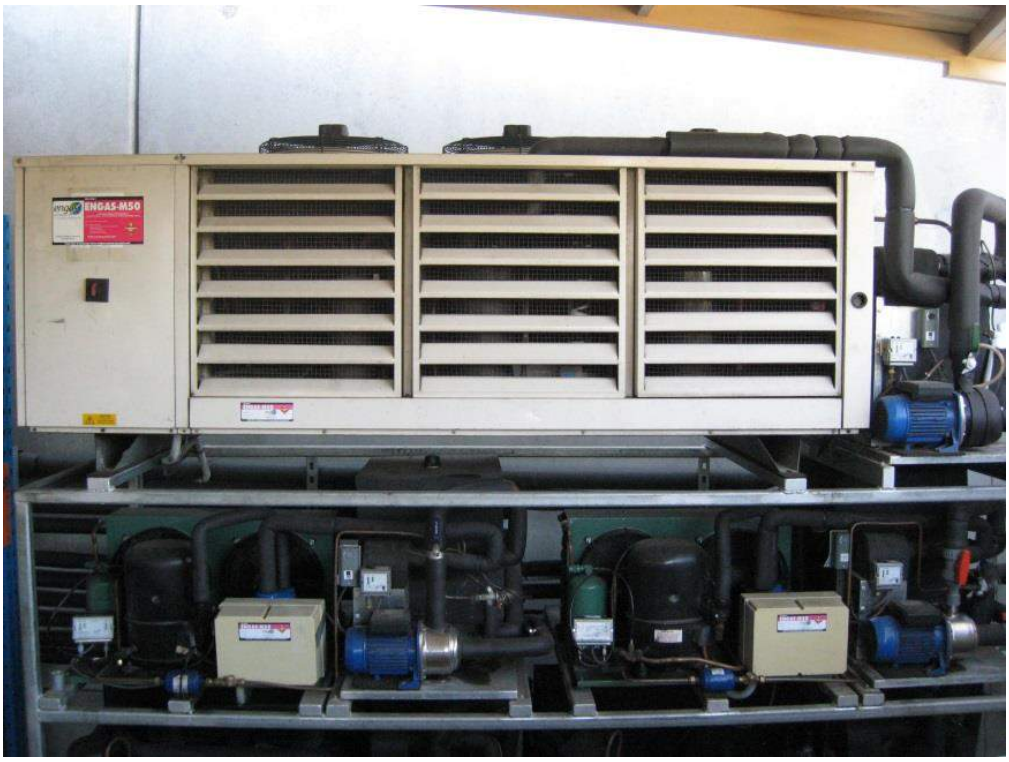
The new water/glycol system was then fully flushed, then filled with a carefully calculated water and food grade propylene glycol mix to suit the particular temperature application.

All refrigerant pressure switches were replaced with sealed types and the electrical panels were sealed to eliminate the ingress of refrigerant should there be a leak.

The refrigerant circuits were flushed, then vacuumed for extended periods, then pressure and leak tested. The systems were then re-vacuumed – again for extended periods.

Engas M50 was then carefully weighed into each system, and balanced to give optimum performance. The refrigerant charges were minimalized due to the very much shortened refrigerant circuit and the use of the high efficient compact plate heat exchangers.

Each unit was then run up and commissioned with small modifications to refrigerant charge, superheat settings and flow rate changes to maximise the cooling and minimise the power consumption.



The external condensing units, which are in a ‘staff only’ outside location, were clearly labelled. Staff, were already aware of the safety procedures with hydrocarbon refrigerants as they have other cold rooms in another building which utilize these extremely efficient, environmentally benign refrigerants. No naked flames and no smoking signs were carefully positioned and permanently fixed. The whole site is actually a ‘no smoking’ location.

Power consumption comparisons on a before and after basis indicate an overall saving of approximately 22% offering the customer a return on his investment in 18 months.

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