

# NATIONAL DISTRIBUTION CENTRE

Orwell Design Associates were awarded the refrigeration design by one of the UK's leading supermarkets, for a new National Distribution Centre. Based in the East Midlands, this multi-temperature facility was going to be one of the biggest so far for our client.

With energy efficiency at the forefront of the design, 6no Advansor CO<sub>2</sub> refrigeration packs were selected.

Each LT and HT system incorporated a minimum of one variable speed compressor to achieve optimum load balance at all conditions.

Electrical control and sub-distribution panels are mounted and fully wired on each pack. Maximum design pressure being 52 / 30 / 60 120 bar.



Our Pack design for performance & energy consideration included:

- 5K TD between room temperature & evaporating temperature'
- 2K TD allowed between gas cooler outlet temperature & maximum ambient temperature = Trans-critical operation 9K TD between condensing temperature & ambient temperature with 5K subcooling for subcritical.
- Parallel compressor is used for better performance.
- Air cooled LT de-superheater is arranged for DT 1, 2 & 3. Heat reclaim plate heat exchanger for freezer underfloor heating connected to DT 4, 5 & 6 LT discharge line as LT de-superheater for better performance.
- Pipework is designed to allow a maximum 0.5K pressure drop in all suction lines.
- All pipes run high level inside the coldrooms to minimise the non-useful superheat in all suction lines.
- Four dual PRV sets are installed on each pack (HT suction, LT suction, liquid receiver & HT discharge).
- Minimum 12.6°C condensing temperature restricted by compressor envelope.
- Discharge pressure 120 bar.
- 3 x 170 litre receivers for DT1, 2 & 3, and 2 x 170 litre receivers for DT4, 5 & 6

**Our Gas Cooler design consideration for performance and energy included:**

- Coolers & Condensers gas coolers were supplied with EC fans, with each fan motor fitted with local electrical isolation.
- 2K TD between gas cooler outlet temperature and maximum ambient temperature for trans-critical.
- Maximum 10K TD between condensing temperature and ambient temperature for subcritical.
- Gas cooler was sized for 2K TD between gas cooler outlet temperature and maximum ambient temperature for trans-critical. 9K TD between condensing temperature and ambient temperature with 5K subcooling for subcritical.
- Gas cooler fitted with Ecomesh adiabatic pack for better performance at high ambient temperature.
- Blygold coil coating.





Based on the client's requirements, the Kelvion evaporators have a 5K TD between room and evaporating temperature.

Under careful consideration, electric defrost was selected. The evaporator defrost time and duration is carefully designed and controlled based on the evaporator locations to reduce the energy usage for defrost and improve the temperature distribution inside the coldrooms.

The evaporators are able to achieve the required air throw without the air straighteners or diffusers.

RDM was selected for the project controls and front-end system.

Heat reclaim for the freezer underfloor is connected to packs DT4, 6 & 6 LT discharge. This removes more heat than air cooled de-superheater due to low water temperature.



Working to a tight programme, the project was successfully handed over to the client, ready for instant use.