



orwell design associates

PRECISION DESIGN IS EVERYTHING

MULTI CHAMBER DISTRIBUTION CENTRE

When a leading UK seafoods supplier leased a 15,000m² warehouse for their new National Distribution Centre, Orwell Design Associates were engaged to design the refrigeration system for multiple chambers.

frozen
Based in the Northwest of England, the facility consists of three temperature-controlled chambers. One +1°C chilled chamber and two large -22°C

Since the three chambers were a mix of chill and frozen with two different evaporating temperatures, and taking the environment impact into consideration, CO₂ transcritical booster packs were selected.

Based on the client specification the refrigeration packs were designed with consideration for system efficiency, safety and easy operation & maintenance.

Three identical CO₂ boost packs were used with each pack taking 33% of the total refrigeration load.

On each pack, the heat reclaim is configured for warm glycol defrost and freezer room underfloor heating.



Each industrial CO₂ pack incorporates:

- Minimum 4no LT booster reciprocating compressors (2no fixed speed & 2no variable speed). The LT compressors operate at a saturated suction temperature of -30°C and discharge into the HT compressors at -8°C
- Minimum 4no HT reciprocating compressors (2no fixed speed & 2no variable speed), discharging via an oil separator into an external gas cooler.
- Heat exchanger to recover waste heat to a common war glycol circuit.
- Warm glycol defrost to all evaporators.



Liquid refrigerant sub-cooling loop was designed in each pack to ensure a good performance of the liquid expansion valve. The highly efficient Bitzer LSPM compressors are used throughout.

Floor mounted coolers were selected for each of the chambers. This negated the need for any additional structural steelwork support, and the considerable costs associated with it.



There were a number of challenges to consider, some of these being the heat reclaim, long pipe runs and plant room congestion.

- The heat reclaim loop was specifically designed to make sure there is always enough heat for warm gas defrost and underfloor heating, without elevating the discharge pressure under any circumstance.
- Due to very long pipe runs and multiple elevations, the pipework was carefully designed for thermal expansion, oil return, minimal pressure drops etc.
- With the congestion inside the bespoke plantroom, the plantroom ventilation was also carefully designed.

The refrigeration scope also included airlock dehumidification, ductwork and air-blade systems as well as a load shedding system.

Working to a tight programme, the refrigeration was commissioned and operational, with chambers down to temperature, for when the client needed to bring in product.