

STAR VENTURE WITH HUNTSMAN TIOXIDE

The Huntsman Corporation is one of the world's largest privately owned American Companies with interests in Petrochemicals, Chemicals, Aromatics and Polyurethanes. Part of the Huntsman organisation is the Tioxide division producing Titanium Dioxide Pigments used primarily in the production of paints and plastics. Titanium dioxide is the most commonly used pigment in the world, giving end products their brilliant whiteness, opacity and protection. Huntsman Tioxide have manufacturing plants operating throughout the world and in particular UK plants in Teesside and Grimsby.

Star supplied a custom-built refrigeration package as part of Tioxide's £50million extension to the production plant at Greatham site in Teesside. Known as the "ICON 2 Project" the plant extension is to increase production of Titanium Dioxide to 100,000Tonnes/year at the Greatham site.

Huntsman Tioxide requirements were simple. They required an environmentally friendly, energy efficient and reliable refrigeration plant designed to be operated continuously to meet the demands of their chemical production facility.

The refrigeration plant is used to serve their Titanium Dioxide Spiral Heat Exchanger cooling requirements using a Calcium Chloride Brine Solution down to -23C. The refrigeration plant

utilises Ammonia as the natural choice of refrigerant and designed to provide 332Kw refrigeration capacity to allow for system hydraulic gains when operating at the design conditions with cooling water available at +30C.



The evaporator package consists of a Horizontal Suction Separator, Shell and Tube Evaporator, Automatic Oil Rectifier system with interconnecting pipe work and wiring terminating at package junction boxes all designed for operation outdoors in a chemical site environment.

The package was split into two sections with the compressor and condenser section located within a plant room while the evaporator package is located on the plant room roof section, local to the process heat exchangers and pipe work. The complete system is suitable for operation within a Hazardous Zone 2 IIB T3 Area.

The compressor package consists of an Ammonia Refrigeration screw compressor package with lube system and oil cooler, a 200Kw High Voltage TEFC IP55 2 pole EEx "N" motor suitable for 3.3KV, Water-Cooled Shell and Tube Condenser and

Liquid Receiver with all pre-piped with unit wiring terminating at package junction boxes.

Star also provided the plant room ventilation and Ammonia Gas Detection System to EN 378 September 2000 (Refrigerating Systems & Heat Pumps Safety & Environmental requirements).

A remote mounted Siemens TI 545 PLC was provided to control all operating and safety functions of the plant. Hard-wired Zone 2 safety cut-outs/controls were also provided as a site safety requirement.

Interconnecting Brine and Ammonia pipe work was site installed after the packages were positioned.

Star Refrigeration worked closely with the Huntsman Tioxide and FWEL Project team to produce a "Project Specific" refrigeration Plant designed for continuous operation and reliability. There were certain Specific Project Requirements required by the team including:

- Plant Operational Reliability (24/7)
- Dual Oil Pumps with automatic changeover
- Dual Oil Filters
- High Corrosion Allowance on Evaporator (3mm)
- Designed to PED requirements
- All Vessels/Pipe work in LT50 Carbon Steel
- Flange Connections to allow easy removal of evaporator from separator on package
- In-Built standby components

- Capital Spares including a spare bare shaft compressor, evaporator, motor and condenser
- Ammonia gas detection/ventilation requirement to the plant room
- Automatic Oil Recovery
- First Year Maintenance Included
- Use site specified instrumentation
- Hazop Study Attendance



The packages were manufactured and assembled at Star's factory in Glasgow with regular visits from the Tioxide/FWEL inspection personnel to discuss the progress of the project documentation, build programme and factory tests.

With the packages built in a modular construction to meet site dimensional constraints, the site installation costs were kept to a minimum.

The packages were delivered on time as any delay beyond the agree date would have prevented site services from completing the installation in and around the plant room. The site program was another important factor and one of the reasons why Star was chosen for this important project.

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Star Refrigeration is the UK's largest independent industrial refrigeration engineering company. Star focuses on the design, manufacture, installation, commissioning and maintenance of industrial refrigeration systems. The company offers a turnkey package to all users of refrigeration plant.

Star's technical advisory arm, Star Technical Solutions (STS), operates as an independent consultancy providing advice on refrigeration engineering issues. Star also owns food freezing and chilling equipment specialist Starfrost, as well as mechanical and electrical contractors Penec.

For more information, phone Star on 0141 638 7916, email star@star-ref.co.uk or visit www.star-ref.co.uk. Star Refrigeration, Thornliebank Industrial Estate, Glasgow G46 8JW.

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