



Refrigeration, air conditioning and HVAC services

On-board preventative maintenance and inspection services.

Star International's preventative maintenance and inspection services ensure the continued operation of all refrigeration, air conditioning and HVAC systems on-board ship.

Key benefits:

- Identification of leaks undetectable to crew.
- Prevention of potential environmental harm caused by refrigerant leakage.
- Improved system efficiency.
- Increased operational life of systems.
- Identification of component wear prior to failure.
- Reduced risk of system failure and downtime.

We operate to a comprehensive inspection regime, in accordance with F-Gas and REFCOM codes of practice. Scope of service includes:

Refrigeration and liquid chilling equipment

- Leak test all systems as per F-Gas regulations.
- Check all flanges, joints, flare nuts and connections for tightness.
- Check operation of low, high and oil pressure switches.
- Check operation of expansion valves and record superheat setting.
- Check that expansion valve's bulb attachment at evaporator is secure.
- Check refrigeration pipework for potential chaffing in bracketing.
- Check condition of suction line insulation.

- Check all controls, pipework and fittings are secured and vibration free.
- Check for oil or gas leakages around oil separators and compressor bases.
- Carry out general cleaning of plant areas.

Refrigeration compressors

- Check compressors for operation i.e. noise levels etc.
- Check oil level in compressor crankcases.
- Check oil returns to compressors from oil separators.
- Measure suction and discharge temperatures are within acceptable limits.
- Check motor current at fully loaded condition.
- Check correct superheating at compressor suction.
- Measure oil, suction and discharge pressures.
- Check vibration at compressor is within acceptable limits.
- Check body of compressor for oil leaks.
- Ensure mains connections onto motor at compressor are secure.
- Check motor mounting bolts are secure.
- Carry out general leak testing around compressor body.

Air cooled condensers

- Inspect air-cooled condensers for fouling.
- Blow clear all condensers with nitrogen if required.
- Check finning on condenser faces and comb if required.
- Check operation of condenser fan and motor.

Air cooled condensers - *continued*

- Check and test condenser fan controls where fitted.
- Check condition of electrical wiring onto condenser fan motor.
- Monitor discharge pressure to confirm operation of condenser is satisfactory.

Water cooled condensers

- Check water pump operation.
- Check water flow rates across the condenser.
- Check anodes (if applicable).

Evaporators: Air cooling

- Check condensate drains.
- Check fan operation.
- Check operation of heaters where fitted.
- Check running current on all fans.
- Check finning for blockages; advise client if cleaning is required.
- Record air on / air off temperatures.
- Check general condition of external casework evaporators.
- Check support steelwork and hanging brackets.

Evaporators: Water / glycol cooling

- Check water / glycol flow on chilled water evaporators.
- Clean water strainers.
- Check pressure gauges and thermometers.
- Record water on / off temperatures.
- Check general condition and operation of water / glycol circulation system.
- Check glycol level in buffer tank.
- Check concentration level of glycol.

Refrigerant gas detection system

- Calibrate gas detection sensors.
- Check operation of system.

Compressors

- Check compressor for vibration and abnormal noises.
- Check compressor gland seal for gas or oil leakage.
- Record suction pressure / temperature, condensing pressure / temperature and oil pressure / temperature.
- Monitor oil differential pressure.
- Check oil recovery from separators.
- Check oil level in separators.
- Record running hours of each compressor.
- Replace oil filter (once per annum).



A refrigeration system on-board a RORO passenger ferry.

Surge vessels

- Check operation of liquid level control for surge drum.
- Check operation of high and low controls.
- Check general operating level of surge drum.
- Check general condition of surge drum.
- Check oil rectifier.
- Drain oil from rectifier if required.
- Check electrical heater in rectifier.
- Check operation of rectifier control stat.
- Check general condition of rectifier.

General system

- Carry out thorough leak test on system, to include compressors, condensers, evaporators, pipework etc.
- Inspect pipework for signs of corrosion etc.
- Carry out visual inspection of liquid receiver and sight glass.
- Ensure system is clean and tidy.
- Carry out general manufacturer recommendations on equipment, lubricate bearings etc.

Electrical

- Check electrical control panels internally for signs of loose cables or burning.
- Ensure terminals are secure to contactors and control relays.
- Check fuse ratings and / or overloads for correct sizing.
- Check all switches and amp meters on control panel fascias.
- Check all electrical cabling between motor control panels and equipment.
- Check all operating controls / thermostats.
- Ensure control panels are left clean and with all internal cable trays secure.
- Advise client if any reparation works are required.
- Shut down compressor / system and open up compressor control panels for inspection.

Electrical - *continued*

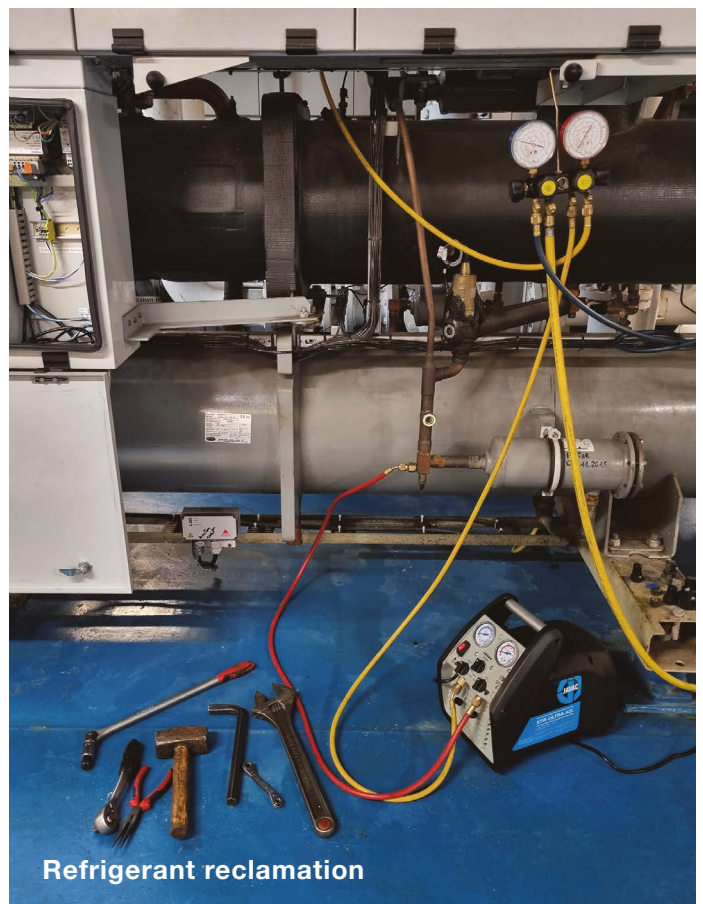
- Inspect compressor contactors for overheating or contact splashing.
- Carry out motor resistance check and record all findings.
- Ensure all panel lamp indication is working.
- Interrogate system controller.

System relief valves

In accordance with current legislative requirements, refrigerant relief valves on both the high and low-pressure sides of the system require testing at a minimal interval of once every five years.

All release valves are checked during service procedures, with clients informed of any requirement for repair, replacement or re-testing.

Certification is provided with each relief valve, either new or re-tested for your insurance requirements.



Refrigerant reclamation

Air conditioning equipment

Internal fan coil units

- Check condensate pumps for correct operation.
- Visually inspect condensate drains and clean if required.
- Clean / fin comb coil where necessary.
- Check operation of air distribution fan.
- Record air on / off temperatures.
- Check operation of hand-held controllers.
- Check system in cooling operation.
- Check system in heating operation.
- Check and clean air filters where necessary.
- Check operation of condensate pumps.
- Check visual condition of ceiling / wall unit fascias and surrounds.
- Check ceiling support hangers are secure.

Air-cooled condensing units

- Test system for refrigerant leaks, repair minor leaks where required.
- Inspect condenser for satisfactory operation.
- Blow clean condenser as required.
- Ensure condenser fans and fan controls are operative.
- Run air conditioning system on test and monitor operation.

On completion of the service, a full inspection checklist is completed, detailing all relevant operation pressures and temperatures, and the settings of all safety and operating controls.



Star International

Head Office: Star House, Turbine Business Park, Turbine Road,
Birkenhead, Merseyside, CH41 9BA United Kingdom

Tel: +44 (0) 1244 504 500
Email: enquiries@star-international.co.uk
Web: www.star-international.co.uk