

# **Calorifier General O & M**

## **INSTALLATION**

Foundations must be adequate to ensure that the unit will not settle and cause pipe strain or distortion of the shell.

It is recommended that the heat exchanger be installed in a level position.

In the case of the cylinders having removable tube bundles, it is necessary to ensure that ample room exists for withdrawing the bundle clear of shell.

Tightening of bolts should be evenly distributed over flanges, each bolt being gradually tightened in succession.

Distortion can occur to pipe connections during transit/handling especially extended types, if this does happen they can be straightened by insertion of a threaded pipe and pulling square.

If an anti-stratification pump set is fitted, the pipe-work and circulator may be supplied loose for fitting on site, (this is to avoid damage in transit). The pump should be installed to circulate water from the top of the cylinder to the bottom. Reference should be made to the manufacturers specific instructions.

The unit should be flushed thoroughly with clean water prior to operation.

## **OPERATION**

Do not operate the equipment at pressures or temperatures or other conditions in excess of those specified on the nameplates or vessel marking.

Open all vents to prevent air locking.

Slowly introduce secondary fluid into the shell and when all spaces are filled, close cold vents and slowly raise to required operating pressure.

Gradually admit the primary fluid into the exchanger and when all spaces are filled close vents and slowly allow the unit to reach operating temperature.

In the event of the secondary operating pressure being higher than the primary pressure, the primary tubes must never be emptied exposing them to secondary pressure. This could result in collapse of the primary tubes.

In the event of pulsations occurring under start-up conditions, reduce the fluid until pulsations disappear.

Check that all gaskets are effective when unit is operating. If leaks are evident remove and tighten bolts as necessary.

In steam vapour heated units, ensure that the vessel is drained of cold condensate before admitting hot vapour.

Cylinders fitted with anti-stratification pump sets should have circulators wired to run continuously. Please refer to manufacturers instructions for further details.

## MAINTENANCE

The shell should be periodically cleaned of all dirt and sludge and sterilised thereafter. Inspect internal surfaces for pitting and corrosion. All cleaning etc. to be carried out in accordance with current legislation.

When draining vessels ensure an adequate secondary vent is provided, and that it is open to atmosphere prior to opening drain valve.

The inside and outside surfaces of all tubes should be periodically inspected to ensure that the tubes are clean and the bores unblocked. Blocked tubes prevent fluid from circulating and can cause overheating resulting in extremes of expansion which can weaken the tube joints.

Any gradual fall off in performance or increase in pressure indicates that:-

- a. An air or vapour lock exists which can be rectified by cracking the vents.
- b. A coating or scale deposit is present on the tube walls which prevents the effective transference of heat through the tubes. The thickness of the deposit is related to the actual loss of heat transmission.

Inspection of the outside surface of a fixed coil can be through the inspection opening (where fitted) or by removal through the bolted end (where fitted).

To gain access to the tubes of a removable battery reduce all pressures and drain all fluids from the units, (open all vents and drain cocks). Remove header to expose tubes and tubeplates. It is advisable to mark all relative positions of covers, etc, to ensure correct reassembly. Inspect tube joints and tubeplates for leaks.

By removal of the bundle or through the inspection opening (where fitted) inspect all tubes for deterioration/leakage. Pressure test if visual inspection does not highlight fractures.

Leaks between tubes and tube-plates may be effectively sealed by releasing the pressure in the shell and lightly expanding the defective tube. Do not apply undue pressure when expanding and do not attempt to re-expand tubes which are not leaking. Always use roller type expanders.

Great care should be taken where facilities exist for removing tube bundles from shells since it is important that no distortion or damage is caused by careless or improper handling. When withdrawing or handling the tube bundle do not use hooks or similar tools as these are liable to cause damage to the tube. Avoid damaging gasket seating surfaces of flanges. When lifting bundle horizontally, always ensure even distribution of weight along the length. The withdrawn bundle is to be entirely supported by the tube plate and support plates resting on wooden blocks cut to fit the curvature of the bundle, under no circumstances allow the tube bundle to be supported on the tubes. Take great care not to bend or distort baffles in any way as they are a close fit in the shell and if the clearance is increased, the performance of the unit will be seriously affected.

Methods of cleaning tube deposits includes:-

- a. Mechanical means involving brushes and scrapers. Care should be taken not to cut into metal surfaces.
- b. Chemical cleaning using acid solution containing inhibitors.
- c. Water soluble deposits are best removed by circulation of hot fresh wash or condensate.
- d. Soft deposits can be removed by rapid circulating of hot wash oil or solvent.

Do not blow steam through single tubes since this may cause the tube to expand and disrupt the tube joint.

Do not blow air through units when fluids normally circulating are of an inflammable nature.

It is recommended that a complete new set of gaskets be fitted when re-assembling the heat exchanger, bolted head or inspection opening.

After re-assembly, the unit may be hydraulically tested up to pressures shown on the nameplate, although a visual inspection at working conditions may suffice.

For details of cylinders fitted with anti-stratification pump sets refer to the manufactures instructions.