

## Heating or Cooling Elements used in storage tanks, condensate tanks etc.

SUPERSEDES: NEW

EFFECTIVE: February 1, 1996

See instruction sheet 402-056 for details for pressure vessels.

### GENERAL

All elements fabricated by Taco Inc. are designed in accordance with the ASME Code for Unfired Pressure Vessels. A set of gaskets is supplied for use with each bundle (do not re-use old gaskets). Before shipment all elements are code tested and accepted by a commissioned inspector.

### Installation:

1. Provide sufficient clearance at the element end of the vessel to remove tube bundle from the vessel. Piping should be installed to facilitate such removal.
2. Provide thermometer and pressure gauge connections in piping to and from element as close to unit as practical.
3. Arrange piping full size to head connections with valves and by-passes so that tube bundle may be isolated from the system for inspection and repairs.
4. Provide vent cocks, drain cocks and vacuum breakers where required to vent, drain and prevent possible collapse of tube bundles.
5. The vessel containing the tube bundle should be set level and square so that, particularly for steam condensing applications, continuous drainage is assured.
6. Support all piping independently from the head connections to prevent excessive strain on the head and gasket surfaces.
7. Piping-up should not require forcing to make connections to the tube bundle nor should connections be tightened too severely for reasons given in 6.
8. The supply system to the unit should be clean prior to operation to prevent fouling tubes.
9. Adequate supply of heating or cooling medium to the unit is most important with care being taken to ensure required quantity at the correct pressure being available at the unit. The sizing of pipe lines and control valves should be ample to reduce pressure loss to a minimum and valved by-passes should be installed around all control devices to assure continuity of operation for service or failure of such devices. All controls should be installed with care in accordance with instructions provided.
10. Continuous circulation of the heating or cooling medium is a necessity for production of heated or cooled liquid in the vessel itself. For steam heated units continuous and complete removal of condensate and air is essential for satisfactory performance. The steam trap selected should have a capacity of at least three times the condensing rate of the element, and should be capable of handling air and condensate. A strainer and shut-off valve should be installed ahead of the trap and a 3-valve by-pass around it for cleaning strainer and service to trap.
11. Do not cover name plates, etc. with insulation so that subsequent identification, rating check, etc. can be made.

### OPERATION

1. When placing unit in operation, open vent connections and when all air is vented, start to circulate the cold medium only. The hot medium – steam or hot liquid, should then be introduced gradually until the exchanger is up to temperature.
2. Start operation gradually – do not admit hot fluid suddenly when empty or cold. Do not shock exchanger with cold fluid when unit is hot.
3. When shutting unit down, the flow of the hot medium should be stopped first.
4. Drain all fluids when shutting down if there is a possibility of freezing or corrosion.
5. Do not operate unit under conditions in excess of those for which it was designed.

### MAINTENANCE

1. Provide means for periodically cleaning either by
  - (a) Use of suitable cleaning compound
  - (b) Mechanical means, if use of solvent is unsatisfactory.
2. Regularly inspect interior and exterior condition of all tubes, and keep them clean. Dirty fouled tube surfaces

will reduce element capacity. Complete stoppage of flow in some tubes may result in overheating, with resulting damage to these tubes.

3. Do not open element for inspection until all pressure is off and unit completely drained.
4. Do not handle tube bundles with hooks or other tools which might damage tubes. Tube bundles are frequently very heavy, but the tubes are small and of relatively light gauge and are easily damaged.
5. Make periodic inspection of control equipment and relief valves to ensure their proper continuous operation.
6. Check and clean, frequently, steam trap and strainer on condensate outlet line. Improper operation of these parts will result in an accumulation of condensate in the steam space which may result in serious damage to the tube bundle.
7. When elements are withdrawn or remounted in vessels, care should be taken not to damage tube bundle by permitting it to rest or drag on the element nozzle on the vessel. This may be prevented with the use of 2 or 3 rods in the lower nozzle flange bolt holes to act as guides and supports.
8. In remounting elements, make sure that bundle rests on support brackets, where provided, in shell. In addition, make sure that element is not rotated so that tubes do not line up with partition baffles in the head.
9. Regular inspection procedures as outlined for pressure vessels regarding repairs, corrosion, distortion of parts, testing, working pressure reduction resulting and adequate reporting are recommended.
10. Bundles fitted with double wall tubes and double tube sheets, primarily for use in potable water applications, should be checked for tube failure as indicated by leakage from the gap between the two tube sheets. Any leakage appearing will require leaking tubes to be plugged and/or bundle to be replaced.

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