ENERQUIP HEAT EXCHANGER

GENERAL INSTALLATION AND OPERATING INSTRUCTIONS:

There are two basic types of heat exchanger construction that these instructions apply to. They are the "U" tube TEMA type BEU and the straight tube TEMA types BEM and BEP. Your heat exchanger type can be found on the Heat Exchanger Specification Sheet provided to you with your heat exchanger quote. Following these instructions can prevent premature loss of unit performance and failure.

INSTALLATION:

1. **Provide sufficient clearance as follows:**
   a.) BEU type units require clearance at the head of the unit to permit removal of the tube bundle from the shell.
   b.) BEM and BEP type units require 3 to 4 feet at the front and rear heads to permit removal of the heads, inspection and cleaning of the straight tubes.
   c.) For conformance to 3-A Sanitary Standards, the following is required:
   1.) Horizontal sanitary heat exchangers shall be mounted with a minimum clearance of 6" between the floor and the lowest part of the unit.
   2.) Vertical heat exchangers shall be mounted with a minimum of 4" of clearance between a wall or column and the outside of the heat exchanger.

2. **Provide valves and bypasses in the piping system so the heat exchanger may be by-passed to permit removal (if applicable) for inspection, cleaning and repair.**

3. **Provide thermometer wells and pressure gauge connections in all piping, locating these close to the exchanger inlet and outlet.**

4. **Provide air vent cocks in unit piping to allow purging of non-condensable gases.**

5. **Foundations must be adequate so the exchanger will not settle and strain piping.**

6. **If Enerquip has provided the mounting support feet, one foot support should be installed in a manner that will allow for thermal expansion. The bolting for this foot should only be torqued to approximately 1 to 5 ft./lbs. If the customer is providing the supports, a thermal growth support design should be used. Please consult Enerquip Engineering for recommendations on customer provided unit support feet.**

7. **Install the unit in a manner that will prevent the forcing of piping connections and that will allow the proper draining of the unit.**

8. **Inspect all openings in the exchanger for foreign material. Do not expose the unit to the elements with it's covers removed from nozzles since rain water may enter the unit and cause severe damage if allowed to freeze.**

9. **Be sure the entire system is clean before starting operation to prevent plugging tubes with any foreign matter.**

10. **Gauge glasses should be installed in all vapor or gas environments to indicate potential flooding of these areas. These areas will flood if the condensate piping becomes clogged, the steam trap fails, or if the steam trap is inadequately sized.**

OPERATION:

1. **When placing a unit in operation, open the vent connections and start to circulate the cold medium only. Be sure the passages in the exchanger are filled with the cold fluid before closing the vents. The hot medium should then be introduced gradually until all passages are filled with liquid. In the case of steam, start the flow slowly while the cold medium comes up to temperature slowly.**

2. **Start operation gradually. Do not admit hot medium into the unit suddenly when empty or cold. Do not shock the unit with cold fluid when the unit is hot.**

3. **If the unit is of straight tube construction (BEM) and is going to be subjected to Clean In Place (CIP) or Steam In Place (SIP), a procedure to simultaneously heat both the shell and tube sides of the heat exchanger must be used to minimize thermal stresses. The objective of this procedure is to minimize the difference in thermal expansion between the unit's shell and tube sides. Such differentials can create large mechanical stresses that may lead to premature unit failure. Consult Enerquip's Engineering Department for recommendations for this procedure.**

(Note – Product contact surface which can not be mechanically cleaned, such as 'O' ring grooves or metal to metal contact points, may require removal for manual cleaning. The need for such cleaning and the frequency of cleaning is dependant on the process. Contact Enerquips Engineering Department for more details or information on a specific heat exchanger.)

4. **In shutting down a unit, the flow of any hot medium should be shut off first. If, for any reason, it is necessary to stop circulation of a cooling medium, the circulation of any hot medium should also be stopped by by-passing or other suitable means.**

5. **Do not operate equipment under conditions in excess of those specified on the unit nameplate.**

6. **When shutting down a unit, drain all fluids to eliminate the possibility of freezing and/or corrosion. To guard against water hammer, all condensate should be drained from steam heaters and similar apparatuses at the time of start-up and shut-down.**

MAINTENANCE:

1. **Provide means for frequent cleaning of heat exchangers as suggested below:**
   a.) **Some commercial cleaning compounds may be used to remove sludge or coke if hot wash, oil or water washing does not give satisfactory results.**
   b.) **If the above described method is ineffective for the removal of hard scale, a mechanical means of cleaning may be used.**

2. **At regular intervals, inspect the interior and exterior condition of all tubes and keep them clean. Failure to keep all tubes clean may, in time, result in termination of flow through some tubes. Such termination of flow leads to tube leaks and rupture.**

3. **Do not attempt to clean tubes by blowing steam through individual tubes. This will cause over stressing of these tubes and possible failure, especially in a TEMA type BEM unit constructed with straight tubes. TEMA type BEU bundles should be moved about on cradles or skids.**

4. **Exchangers subjected to fouling should be cleaned periodically. A marked increase in pressure drop and/or reduction in thermal performance usually indicates that cleaning is necessary. Frequent cleanings are recommended since the greater the build up of scale, the more difficult it is to remove.**

5. **In cleaning a tube bundle, tubes should not be hammered on with any metallic tool. If it is necessary to use scrapers, care should be exercised that the scraper is not sharp enough to cut the metal of the tubes.**

6. **When removing a tube bundle from an exchanger for inspection or cleaning, care should be exercised so that it is not damaged by improper handling. Tube bundles are often of great weight. Despite this, tubes are small and of relatively thin material. Once removed, tube bundles should be properly supported with cradles located under baffles.**

(install.doc; 10 April 2007)