SELECTING A LIQUID TO LIQUID CONVERTER

SELECTION PROCEDURE

Heat lost or gained from one side of a heat exchanger must be equal to the heat lost or gained by the other side of the heat exchanger. This heat is called the load "Q" and is expressed in BTU/Hr. (One BTU is the amount of heat required to raise one pound of water one degree Fahrenheit.) The volume of water is usually given in gallons per minute (GPM); therefore, the following formula will apply:

$Q = GPM \times 500 \times \Delta T = BTU/Hr.$
Where Q = Load in BTU/Hr.
500 = (60 Min./Hr. × 8⅓ pounds/gallon) converts GPM to pounds per hour.
ΔT = number of degrees the water is heated or cooled.

Example:
Heat 120 GPM of water in the tubes entering at 120° F and leaving at 140° F with 80 GPM of water in the shell entering at 200° F and leaving at 170° F. Allow for .0005 fouling.

Step 1. Calculate load — Q.
Step 2. Determine log mean temperature difference — LMTD
Step 3. Determine log mean temperature difference corrected — $LMTD_c$.
Step 4. Calculate estimated heating surface and select a trial unit diameter.
Step 5. Determine water velocity in tube side — V_t.
Step 6. Determine inside film coefficient — h_i.
Step 7. Determine water velocity in shell side — V_s.
Step 8. Correct water velocity in shell side.
Step 9. Determine outside film coefficient — h_o.
Step 10. Correct outside film coefficient.
Step 11. Determine overall coefficient of heat transfer — U_c.
Step 12. Correct for fouling if required.
Step 13. Calculate heating surface required.
Step 14. Select unit.
Step 15. Determine tube side pressure drop.
Step 16. Determine shell side pressure drop.

NOTE:1) Standard Material of construction
Shell - steel
Tubes - 3/4" O>D> x 20 BWG copper
Head - cast iron or fabricated steel
Tube- Sheet
Tube support - steel
2) Alternate material, design pressures and tube gauges are available.
3) Liquid to glycol is available, contact factory.

MEPCO

SELECTING A STEAM TO LIQUID CONVERTER

SELECTION PROCEDURE

The following conditions must be known before a unit can be selected.

A Design water flow in tubes — G.P.M.
B Entering and leaving water temperature — °F
C Steam pressure available at inlet P.S.I.G.

Step 1 Determine clean tube temperature coefficient from Table 1, page 2 or Chart 1, page 5.

Step 2 Determine unit model from capacity tables by moving down the required G.P.M. column. Select a unit having a temperature coefficient equal to or greater than the value determined in step 1. If no fouling is specified, use this selection. If fouling is specified, determine tube velocity. Capacity tables show water velocity for various flow rates.

Step 3 Based upon the velocity and specified fouling factor, determine the temperature coefficient correction from Chart 2, page 6.

Step 4 Multiply the clean tube temperature coefficient by the fouling correction factor and make final unit selection.

Step 5 Determine pressure drop for unit selected. Correct for average water temperature using Table 2, page 4. Note. pressure drops less than 1 ft. are omitted from capacity tables.

Example:

Heat 120 G.P.M. of water from 40 to 140°F in tubes with 20 P.S.I.G. steam in shell. Fouling — .0005

Step 1 Clean tube temperature coefficient from Table 1, page 2, is 6.7.

Step 2 in Capacity Table for 8" diameter 2 pass, page 9, preliminary selection is 8214-S. Velocity in tubes is 4.7 FPS.

Step 3 Based on a tube velocity of 4.7 FPS and .0005 fouling factor Chart 2, page 6 correction is 1.36.

Step 4 The corrected temperature coefficient is 9.1 (1.36 x 6.7). Final selection is 8218-S.

Step 5 Average temperature in tubes is 90°F. From Table 2, page 4, water pressure drop correction is 1.12. From Capacity Table for 8218-S, pressure drop is 4.2 ft. Corrected pressure drop is 4.7 ft. (1.12 x 4.2 = 4.7)

NOTE:1) Standard Material of construction
Shell - steel
Tubes - 3/4" O>D> x 20 BWG copper
Head - cast iron or fabricated steel
Tube- Sheet
Tube support - steel
2) Alternate material, design pressures and tube gauges are available.
3) Steam to glycol is available, contact factory.