

DESIGN REQUIREMENTS

HEAT EXCHANGERS FOR HVAC

GENERAL INFORMATION

- 1.1 This section applies to shell end tube and plate and frame heat exchangers.

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- 2.1 Consultant shall schedule all parameters of the heat exchanger, including the fouling factor on the drawings.
- 2.2 Consultant shall indicate on the drawings the area for the tube pull.
- 2.3 All steam to hot water exchangers that undergo variable load shall utilize a 1/3, 2/3 control valve setup that includes a manual bypass. The 1/3 valve shall be initial operating valve with the 2/3 valve opening after the 1/3 valve is fully open.
- 2.4 Provide a 100 percent back-up heat exchanger for heating applications.
- 2.5 Provide minimum 12" vertical height from steam traps discharge to underside of heat exchanger. The discharge of the steam trap shall then be pitched away from the trap so it can drain by gravity. Vertical lifts are not allowed on low pressure systems with control valves. A vacuum breaker and a safety valve on shell shall be provided on steam to water systems. A relief valve on tube side shall be provided before the isolation valves.
- 2.6 U-Tube Heat Exchangers, Steam to Water and Water to Water
- a. Heat exchangers used to generate hot water from steam shall be shell and tube type with removable U-bend tube bundles. Steam shall be circulated in the shell and water in the tubes. Heat exchangers shall be furnished with mounting legs and shall rest upon substantial angle iron supports. Small exchangers can be mounted on trapeze hangers.
 - b. Heat exchangers shall be constructed with a steel shell, minimum, number 18 AWG, 3/4" copper tubes and a removable cast iron or steel head. Water velocity in the tubes shall not exceed 7.5 feet per second, nor be less than 2 feet per second. The shell shall be provided with inlet and outlet tapings, tapings for a pressure gauge, and tapings for a pressure relief valve.
 - c. Heat exchangers must be of ASME construction and stamped, with the shell rated at a test pressure of 300 psig and a working pressure of 125 psig at 375° for steam to water

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and 125 psig at 300°F for water to water. The specifications shall require that a manufacturer's data sheet report for unfired pressure vessels (Form U-1 in the ASME Code) be submitted.

- d. A fouling factor of 0.0005 shall be utilized in the selection of all converters.

2.7 Plate and Frame Water to Water Heat Exchangers

- a. Where U-tube heat exchangers are no longer practical, water to water heat exchangers shall be plate & frame type.
- b. The plate and frame heat exchanger shall have heat transfer plates pressed out of Type 304 stainless steel. The number of plates shall provide the total square footage of effective heat transfer area to meet the required design conditions. All components in fluid contact on the primary and secondary circuits shall be fabricated of Type 304 stainless steel.
- c. Each heat transfer plate shall have herringbone corrugations to optimize heat transfer with nominal pressure losses.
- d. The complete assembly shall be factory assembled, stamped and tested in accordance with the ASME code, Section VIII, Division I for a design pressure of 250 psig at 100°F for both circuits. The specifications shall require that a manufacturer's data sheet report for unfired pressure vessels (Form U-1 in the ASME Code) be submitted.
- e. All plate and frame heat exchangers shall be selected so that the frame can accommodate the addition of 25% extra heat transfer plates.
- f. A fouling factor of 0.0005 on both sides of the plate shall be utilized in the selection of all plate and frame heat exchangers.
- g. Plate and frame heat exchangers shall have piping and valves installed for back-flush capability.

CONSTRUCTION REQUIREMENTS

- 3.1 Install plate/frame heat exchangers on concrete inertia block.
- 3.2 Shell and tube heat exchangers shall be supported from the floor with angle iron framing.



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REFERENCE

- 4.1 The applicable CSI Specification Section is 23 57 00.