

SECTION 23 57 00 - HEAT EXCHANGERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section describes standards for heat exchangers, accessories, and trim.

1.2 SYSTEM DESIGN REQUIREMENTS

- A. The campus central steam distribution will provide the source for producing clean steam, heating water, and domestic hot water for the buildings whenever possible.
- B. Provide steam in shell and water in tubes to convert steam heat to hot water for hydronic heating systems.
- C. Hot Water Heating Systems:
 - 1. Design hot water heating system with duplex converters and duplex main circulating pumps each capable of meeting the load individually.
 - 2. Locate heat exchangers to allow removal of tube bundles without interference.
 - 3. Provide air separators on systems.
 - 4. Reset hot water temperature based upon outdoor air temperature and control by the BAS.
- D. Domestic Hot Water Heaters: Where steam is available, provide an instantaneous steam heat exchanger. Gas fired, or small electric heaters are acceptable with approval of the University Project Manager.
- E. Steam Humidification:
 - 1. Use clean steam generators for humidification.
 - 2. Humidifiers shall be self-cleaning if available as an accessory.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Shell and Tube Type and Plate and Frame Type Heat Exchangers
 - a. Bell & Gossett ITT
 - b. Alfa Laval.
 - c. Armstrong
 - d. Triangle Tube
 - 2. Vertical Flooded Tube (application subject to the university Approval during design):
 - a. Maxi-Therm
 - b. Advanced Steam
 - 3. Steam to Steam Generators:
 - a. Cemline

2.2 MATERIALS, GENERAL

- A. Shell and Tube-type Heat Exchanger:
 - 1. Tubes: U-tube type with 3/4 inch OD minimum seamless copper tubes suitable for 250 psig working pressure.
 - 2. Shell: Steel with threaded or flanged piping connections and necessary tappings, steel saddle and attaching U-bolts, prime coated.
 - 3. Heads: Cast iron or fabricated steel tube sheets threaded or flanged for piping connections.
 - 4. Water chamber and tube bundle: Easily removable for inspection and cleaning.

5. Domestic water application: provide stainless steel double wall exchanger.
 - B. Plate and Frame Heat Exchangers:
 1. General: Pre-assembled, pressure tested at the factory, and flushed clean, ready for connection to piping.
 2. Designed, fabricated, and tested for operation in accordance with the ASME Unfired Pressure Vessel Code, Section VIII, Division 1, including the latest addenda and code stamped.
 3. Enclose plate rack in a removable painted, rust protected carbon steel metal shroud designed to protect the plate rack from debris and damage.
 4. All exterior steel surfaces shall be sharp steel shot blasted followed by one coat of two part epoxy spray enamel baked at 250 degrees F.
 - C. Clean Steam Generators:
 1. General: Unfired, skid mounted, packaged steam to steam generator constructed of welded steel, with copper tube bundle.
 2. Tank: Designed, constructed, and stamped to meet requirements of ASME Code Section VIII for Unfired Pressure Vessels.
 3. Tube Bundles: U-tube design pitched and arranged to enable exterior cleaning.
 4. Insulation: Cover shell with 2-inch fiber insulation and protected by a zinc-plated sheet steel jacket.
 5. Controls: Provide electrical signal to the steam regulator valve. Provide liquid level controls to the feed water pump or valve. Provide electrically steam regulator valve with bypass connections, strainers and steam traps.
 6. Gauges and Valves: Provide unit with gage glass to permit visual inspection of water level. Provide thermometers or steam gages to monitor unit performance. Provide safety valves per ASME Section I Boiler Code. Provide blow-off valves in tandem arrangement on the bottom of the shell.
 7. Supply water shall be softened through an independent ion exchange softener
 - D. Spare Parts: Refer to Section 01 78 46 – Extra Stock Materials.
- 2.3 Domestic Hot Water Heaters:
- A. Instantaneous heaters shall have feed-forward control. Selection shall be based upon 2 to 15 psig inlet steam, ductile iron shell with copper coils.
 - B. Floor mount instantaneous water heaters on custom fabricated frames made of 1-1/2 inch angle iron, and all components shall be contained within the outside dimensions of the skid frame.
 - C. Valve plugs shall be manufactured of Hastaloy C with finishes <16 RMS.
 - D. Pins and retainers shall be constructed of Monel or Stainless steel.
 - E. Final selection will be based on space requirements, hot water requirements, and steam availability.
 - F. Electric Storage tank water heaters are unacceptable.
 - G. Heat exchanger shall not use arsenic or antimony.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install in accordance with manufacturer's instructions.

- B. Install to permit removal of tube bundle with minimum disturbance to installed equipment and piping.
- C. Support heat exchangers on welded steel angle from floor structure above.
- D. Pitch shell to completely drain condensate.
- E. Pipe relief valves to the nearest roof or floor drain.
- F. Pipe drain valves to nearest floor drain.
- G. Steam Piping: Provide piping as indicated, including control valve with 3-valve bypass, strainer, and pressure gauge on inlet; condensate dirt leg steam trap with 3-valve bypass, strainer and check valve on outlet; air vent or vacuum breaker on shell.
- H. Water Piping: Provide piping as indicated, including union, shutoff valve, and thermometer on inlet and outlet. Pipe relief valve outlet to floor drain.
- I. Steam-to-Water Heat Exchanger Trim:
 - 1. Shell: Pressure gauge tapping with pigtail siphon, vacuum breaker.
 - 2. Water Inlet: Thermometer well, pressure gauge tapping, valved drain.
 - 3. Water Outlet: Thermometer well for temperature regulator sensor, ASME rated pressure and temperature relief valve, thermometer well, pressure gauge tapping.

3.2 TESTING, CLEANING, AND CERTIFICATION

- A. Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

3.3 COMMISSIONING (DEMONSTRATION)

- A. Provide factory start-up services for the Steam to Steam generator to witness system start-up and check the performance of all controls and to provide operation and maintenance instruction of the equipment.

END OF SECTION 23 57 00