



## **SECTION 23 57 00 - HEAT EXCHANGERS FOR HVAC**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes shell and coil, shell and tube, and plate heat exchangers.

#### **1.2 SUBMITTALS**

- A. Product Data: Include rated capacities, operating characteristics, dimensions, furnished specialties, and accessories. Provide Los Angeles City Research Report Approval Letter or Los Angeles City One-Time Approval.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 1. Design Calculations: Calculate requirements for selecting seismic restraints and for designing bases.
  - 2. Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.
  - 3. Detailed drawings.
  - 4. Strength of material calculations.
- C. Coordination Drawings: Equipment room, drawn to scale, on which the following items are shown and coordinated with each other:
  - 1. Heat Exchanger shown to scale with maintenance access space.
  - 2. Structural members to which heat exchangers will be attached.

#### **1.3 QUALITY ASSURANCE**

- A. ASME Compliance:
  - 1. Fabricate and label heat exchangers to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.
  - 2. Provide all documentation that vessels have passed ASME testing including ASME A-1 form.
  - 3. Provide ASME manufacturer's data report NO. U-1 for shell and coil units.
- B. Factory hydraulically tested to at least 1.5 times specified working pressure for the shell and tube, and shell and coil heat exchanges, and 1.3 times specified working pressure for the plate heat exchanger.

#### **1.4 EXTRA MATERIALS**

- A. Provide two sets of replacement gaskets for the shell and tube as well as plate heat exchangers.



- B. Provide two sets of wrenches for disassembly of plate heat exchangers.
- C. Provide stainless steel nameplates with identical tag indicating design drawings data, sizes and capacity.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
  - 2. Energy Transfer Stations: Several options are enclosed for Energy Transfer Station designs.
    - a. The preferred method is to have a pre-packaged skid utilizing shell and coil or shell and tube heat exchangers, that can be interconnected to the existing heating and domestic hot water systems with minimal down time. They are self-contained and compact in design.

### **2.2 SHELL AND COIL HEAT EXCHANGERS FOR HEATING ENERGY TRANSFER STATIONS (PACKAGED OPTION)**

- A. Manufacturers:
  - 1. **Elge (as manufactured by Alstrom Heat Transfer LLC).**
  - 2. **Alfa Laval.**
  - 3. **Taco.**
- B. Configuration:
  - 1. Equipment to be skid mounted and ready to install consisting of vertical shell and coils for space heating, domestic water heating, piping, isolation valves, control valves and controls.
  - 2. Heat exchangers to be counter cross-flow heat exchangers,
  - 3. Pressure drop on domestic water side at no more than 3psig.
  - 4. Heat exchangers to conform to the latest ASME Code for pressure vessels for maximum operating pressure 250 psig at 600 deg F maximum operating temperature.
- C. Single wall units (heating HX): Consists of a copper coil within a pressure vessel. Coil is manufactured from drawn, smooth, spiral wound copper tubes with an oval cross section. The tubes are separated by spacers forming channels with uniform counter cross-flow areas.
- D. Double wall units (domestic water HX): Consists of copper coil within a pressure vessel. This coil is manufactured from drawn, smooth, spiral wound copper tubes. The copper tubes are joined to a tube sheet and chamber with low flow resistance.



E. Materials:

1. Pressure head: carbon steel hemispherical heads.
2. Copper tube: 3/8" copper tubing with 22 gauge wall.
3. Shell: Steel
4. Coil Connections: copper type L.
5. Heat exchangers to be insulated with 2" fiberglass and jacketed with aluminum jacketing for protection.

F. Accessories

1. Isolation valves so each HX may be removable without interruption of service.
2. Isolation valves at skid connections for attaching to existing heating water system.
3. Hose connections for chemical cleaning and flushing of shell and coils.
4. Temperature control valve
  - a. Actuator – 24 VAC
  - b. Valve body – two way cylinder balanced valve for higher pressures
  - c. Valve internals to be stainless steel
  - d. Shut-off: ANSI Class IV.
5. Flow and pressure controller.
  - a. Valve body – cast steel rated for 560 PSI
  - b. Valve internals to be stainless steel
  - c. Two actuators - One for pressure control and one for flow control
    - (1) Actuators shall be removable without shutting down water flow
    - (2) Thermostatic non-electric operating according to the liquid expansion principle
  - d. Controller will be self-acting proportional for pressure and flow control and monitoring
6. Over heat protection and alarm with 1/2" blowdown with solenoid valve
7. Thermometer in water inlets and outlets.
8. ASME rated temperature and pressure relief valve in water outlet.
9. ASME rated pressure relief valve on each shell and coil heat exchanger in water outlet.
10. Pressure gage with pet cock.
11. Skid mounted on a steel skid primed and painted.
12. Package factory pressure tested.

**2.3 SHELL AND TUBE HEAT EXCHANGERS FOR HEATING ENERGY TRANSFER STATIONS (PACKAGED OPTION)**

A. Manufacturers:

1. **Alfa Laval Thermal, Inc.**
2. **Taco.**
3. **Standard Xchange.**



- B. Configuration:
1. Equipment to be skid mounted and ready to install consisting of shell and tube for space heating, domestic water heating, piping, isolation valves, control valves and controls.
  2. Heat exchangers to be counter cross-flow heat exchangers,
  3. Pressure drop on domestic water side at no more than 3 psig.
  4. Heat exchangers to conform to the latest ASME Code for pressure vessels for maximum operating pressure 250 psig at 600 deg F maximum operating temperature.
- C. Single wall units (heating HX): Consists of a copper coil within a pressure vessel. Coil is manufactured from drawn, smooth, spiral wound copper tubes with an oval cross section. The tubes are separated by spacers forming channels with uniform counter cross-flow areas.
- D. Double wall units (domestic water HX): Consists of copper coil within a pressure vessel. This coil is manufactured from drawn, smooth, spiral wound copper tubes. The copper tubes are joined to a tube sheet and chamber with low flow resistance
- E. Materials:
1. Pressure head: carbon steel hemispherical heads.
  2. Copper tube: 3/8" copper tubing with 22 gauge wall.
  3. Shell: Steel
  4. Piping Connections: shell and head flanged inlet and outlet connections.
  5. Heat exchangers to be insulated with 2" fiberglass and jacketed with aluminum jacketing for protection.
- F. Accessories
1. Isolation valves so each HX may be removable without interruption of service.
  2. Isolation valves at skid connections for attaching to existing heating water system.
  3. Hose connections for chemical cleaning and flushing of shell and coils.
  4. Temperature control valve
    - a. Actuator – 24 VAC
    - b. Valve body – two way cylinder balanced valve for higher pressures
    - c. Valve internals to be stainless steel
    - d. Shut-off: ANSI Class IV.
  5. Flow and pressure controller.
    - a. Valve body – cast steel rated for 560 PSI
    - b. Valve internals to be stainless steel
    - c. Two actuators - One for pressure control and one for flow control
      - (1) Actuators shall be removable without shutting down water flow
      - (2) Thermostatic non-electric operating according to the liquid expansion principle
    - d. Controller will be self-acting proportional for pressure and flow control and monitoring
  6. Over heat protection and alarm with 1/2" blowdown with solenoid valve



7. Thermometer in water inlets and outlets.
8. ASME rated temperature and pressure relief valve in water outlet.
9. ASME rated pressure relief valve on each shell and coil heat exchanger in water outlet.
10. Pressure gage with pet cock.
11. Skid mounted on a steel skid primed and painted.
12. Package factory pressure tested.

## **2.4 BRAZED PLATE HEAT EXCHANGERS FOR HEATING ENERGY TRANSFER STATION (FIELD ASSEMBLED)**

### **A. Manufacturers:**

- 1. Alfa Laval Thermal, Inc.**
- 2. Invensys APV, Inc.**
- 3. Xylem; Bell & Gossett.**

### **B. Configuration:**

1. Brazed factory fabricated assembly consisting of two end plates, one with threaded nozzles and pattern-embossed plates.
2. Units for domestic hot water shall be suitable construction conforming to local codes. Units shall be of double wall construction with air vent leak path. This option would be a field assembled (or prepackaged) alternate to the shell and coil unit specified in paragraph 2.2.
3. End-Plate Material: Type 316 stainless steel.
4. Threaded Nozzles: Type 316 stainless steel.
5. Plate Material: Type 316 stainless steel.
6. Brazing Material: Copper or nickel.
7. Capacity and Characteristics: See equipment schedule on drawings

## **2.5 PLATE HEAT EXCHANGERS**

### **A. Manufacturers:**

- 1. Alfa Laval Thermal Inc.**
- 2. Invensys.**
- 3. Bell & Gossett.**

### **B. Configuration: Freestanding assembly consisting of frame support, top and bottom carrying and guide bars, fixed and movable end plates, tie rods, individually removable plates, and one-piece gaskets.**

1. Frame: Capacity to accommodate 20 percent additional plates. Painted carbon steel with provisions for anchoring to support.



2. Top and Bottom Carrying and Guide Bars: Painted carbon steel, aluminum, or stainless steel.
3. End-Plate Material: Painted carbon steel.
4. Plate Material: 0.031 inch thick before stamping; Type 316 stainless steel.
5. Gasket Material: EPDM.
6. Piping Connections: Threaded port for NPS 2 and smaller. For larger sizes, furnish nozzle with flanged connection.
7. Enclose plates in a solid stainless-steel removable shroud.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine areas for compliance with requirements for installation tolerances and for structural rigidity, strength, anchors, and other conditions affecting performance of heat exchangers.
  1. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 HEAT-EXCHANGER INSTALLATION**

- A. Install heat exchangers and accessories in accordance with manufacturer's instructions. Install so that heat exchangers can be removed without disturbing other equipment or piping. Insulate heat exchanger for personnel protection and heat retention.
- B. Install heat exchangers on concrete base. Concrete base is specified in Division 23 Section "Common Work Results for HVAC," and concrete materials and installation requirements are specified in Division 03.
- C. Concrete Bases: Anchor heat exchanger to concrete base.
  1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.
  2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
  3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  4. Install anchor bolts to elevations required for proper attachment to supported equipment.

### **3.3 CONNECTIONS**

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Maintain manufacturer's recommended clearances for service, maintenance and repair / replacement. Install piping connections to allow service, maintenance and repair/replacement of heat exchangers.
- C. Install shutoff valves at heat-exchanger inlet and outlet connections.
- D. Install relief valves on heat-exchanger heated-fluid connection and install pipe relief valves, full size of valve connection, to floor drain.



- E. Install hose end valve to drain heat exchangers.

### **3.4 FIELD QUALITY CONTROL**

- A. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

### **3.5 CLEANING**

- A. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

### **3.6 TRAINING**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain heat exchangers. Provide minimum of 8 hours each (3 shifts) of classroom and hands on training to LAWA Facilities and Maintenance personnel.

END OF SECTION 23 57 00