

## University of Houston Master Specification

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<Insert Issue Date>

### SECTION 23 1200 - HEAT EXCHANGERS

Maintain Section format, including the UH master spec designation and version date in bold in the center columns of the header and footer. Complete the header and footer with Project information.

Edit and finalize this Section, where prompted by Editor's notes, to suit Project specific requirements. Make selections for the Project at text identified in bold.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
  - 1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas, available on the web site of the Texas Facilities Commission.
  - 2. The University of Houston's *Supplemental General Conditions and Special Conditions for Construction*.

##### 1.2 DESCRIPTION OF WORK

- A. Work Included: Provide heat exchangers as shown, scheduled, indicated, and as specified.
- B. Types: The types of heat exchangers required for the project include, but are not limited to:
  - 1. Shell and tube heat exchangers.
  - 2. Flat plate heat exchangers.

##### 1.3 QUALITY ASSURANCE

- A. Manufacturers: Provide products complying with these specifications and produced by an approved manufacturer

##### 1.4 SUBMITTALS

- A. Shop Drawing submittals shall include, but not be limited to, the following:
  - 1. Cut sheets of the heat exchangers with construction, capacity, ratings, and accessories clearly shown.
  - 2. Include dimensioned drawings of heat exchangers.
  - 3. Additional information as required in Section 23 0100 "Mechanical General Provisions."

##### 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver heat exchangers in factory-fabricated water-resistant wrapping.
- B. Handle heat exchangers carefully to avoid damage to material component, enclosure and finish.
- C. Store heat exchangers in a clean, dry space and protect from the weather.

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### PART 2 - PRODUCTS

#### 2.1 SHELL AND TUBE HEAT EXCHANGERS

- A. Approved Manufacturers
1. : Provide shell-and-tube heat exchangers, complete with steel supporting saddles and produced by one of the following:
    - a. Bell & Gossett
    - b. Patterson-Kelly
    - c. Taco.
  2. Substitutions: Comply with Section 01 2500 "Substitution Procedures."
- B. Exchangers: Design water-to-water heat exchangers with number of passes and arranged as indicated on the Drawings. **[Steam to hot water converters shall be piped with steam in shell and a minimum of two water passes.]**
- C. Construction: Construct components of following materials:
- | 1. Components     | Material   |
|-------------------|--|
| Shell             | Steel  |
| Tube sheets       | <b>[Naval Brass] [Muntz Metal]</b>                                 |
| Tubes             | <b>[Stainless Steel] [18 BWG inhibited Copper Admiralty metal]</b> |
|                   | <b>[5/8 inch OD,] [3/4 inch OD,]</b>                               |
| Heads (Removable) | <b>[Cast iron] or [fabricated steel]</b>                           |
- D. Capacity: Provide units with capacities as scheduled on the Drawings. Pressure drops scheduled are maximum. Fouling factor of 0.0005 shall be included. **[Scale factor shall be 0.003.]** Water velocity shall not exceed 4 fps.
- E. **[Steam Connections: Provide steam, condensate, and vent connections to the exchanger shell. Steam inlet connection on shell shall be beyond the tube U-bends to prevent steam impingement on the tubes.]**
- F. ASME Symbol:
1. Submit a manufacturer's data report for pressure vessels, Form No. U-1 as required by the provisions of the ASME Code Rules, to the Engineer for the Owner.
  2. This form shall be signed by a qualified inspector holding a National Board commission certifying that construction conforms to the latest ASME Code for Pressure Vessels for 300 psig design pressure and system temperatures as indicated on the Drawings and as detailed on Form No. U-1. The ASME "U" symbol shall be stamped on the heat exchangers.
- G. Mounting Saddles
- H. Painting: Heat exchangers and accessories shall be primed and finish-painted using the manufacturer's standard paint system.

#### 2.2 FLAT PLATE HEAT EXCHANGERS

- A. Approved Manufacturers:
1. Provide flat plate heat exchangers, complete with frames and accessories, manufactured by one of the following companies:

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- a. Alfa-Level
  - b. Baltimore Aircoil
  - c. Armstrong
  - d. SPX Flow
  - e. Traner Alfa-Level
2. Substitutions: Comply with Section 01 2500 "Substitution Procedures."
- B. Exchanger Design: Design flat plate heat exchangers with number of plates and plate size required to provide the scheduled capacity. Pressure drops scheduled are maximum. Fouling factor of 0.0005 shall be included. Water velocity shall not exceed 4fps.
  - C. Frame: Provide heat exchanger with an epoxy coated steel frame with lifting lugs. Frame plate and bar design shall permit access to any plate in the plate pack without need to remove any other plates. All plate carrying and guide bar guiding system components shall be stainless steel. Design carrying and guiding bars for 15% future plate expansion capability. The fixed and movable covers shall be of sufficient thickness for the design pressure and code requirements without additional reinforcements of stiffeners.
  - D. Connections: Connections 2 inches and smaller shall be stainless steel NPT type. Connections 2-1/2 inches and larger shall be studed port design to avoid leaks on the port area.
  - E. Compression Bolts: The bolting system shall utilize only four compression bolts for opening and closing the unit. Compression bolts shall not require special tools and shall be equipped with lock washers at the movable cover to allow opening and closing of the unit from the fixed cover. Compression bolts shall be equipped with captive nuts at the fixed cover and threaded nuts at the movable cover. Welding of nuts to the compression bolts will not be acceptable. Compression bolts shall have rolled threads to reduce galling and double width hex nuts to adequately distribute bolt load. Bolts shall be factory lubricated and provided with protective plastic sleeves.
  - F. Plates: Plates shall be pressed type 304 stainless steel with adequate heat transfer area to provide the scheduled capacity. Each individual plate shall be pressed from a homogeneous single metal sheet. Each transfer plate shall have herringbone corrugations to optimize heat transfer and provide support of adjacent plates. All plates and gaskets shall be permanently marked to identify quality and material. Plates shall incorporate a built-in aligning system. An aluminum plate pack shroud shall be provided.
  - G. Gaskets: Gasket material shall be as scheduled or required for the proposed application. Gaskets shall have relieving grooves to prevent intermixing of fluids. All gaskets shall be one piece and shall fit around both the heat transfer areas and port holes. Non-glued gasketing systems are preferred. If adhesive is necessary, use a two-component heat cured epoxy glue that is compatible with the gasket materials and heat exchange fluids.
  - H. Inspection and Testing: Design plate heat exchangers to withstand the full test pressure in one circuit with zero pressure in the alternate circuit. All exchangers shall be hydrostatically tested in accordance with ASME Section VIII, Division 1, Paragraph UG-99.
  - I. Factory Insulation: Provide plate heat exchangers with a factory installed insulation package. Insulation shall meet the flame spread and smoke developed requirements specified in Section 23 0700 "System Insulation."
  - J. Drip Tray: Provide plate heat exchangers with a factory installed drip tray.

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**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. General: Install in accordance with manufacturer's instructions and ASME Code. Provide a pressure relief valve on closed loop side to prevent excessive buildup of heat or pressure. Relief valve shall be selected to coordinate with the piping system pressure rating.

**3.2 TESTING**

- A. General: Test heat exchangers with connected piping systems.

**3.3 INSULATION**

- A. Refer to Section 23 0700 "System Insulation" for non-factory insulated heat exchanger component insulation requirements.

**3.4 DRIP TRAY**

- A. Pipe condensate from heat exchanger drip tray to the nearest floor drain.

**3.5 IDENTIFICATION**

- A. Refer to Section 23 0300 "Basic Materials and Methods" for applicable painting, nameplates, and labeling requirements.

END OF SECTION 23 1200