

SECTION 235700 - HEAT EXCHANGERS FOR HVAC

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.

1.2 SUMMARY

- A. Section includes:
 - 1. Shell and Tube heat exchangers
 - 2. Plate and Frame heat exchangers
 - 3. Heat Transfer Packages

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For heat exchangers to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 SHELL-AND-TUBE HEAT EXCHANGERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. API Heat Transfer Inc.
 - 2. Armstrong Pumps, Inc.

3. ITT Corporation; Bell & Gossett.
4. TACO Incorporated.
- B. Description: Packaged assembly of heat-exchanger and specialties.
- C. Construction:
 1. Fabricate and label heat exchangers to comply with ASME Boiler and Pressure Vessel Code, Section VIII, "Pressure Vessels," Division 1.
- D. Configuration: U-tube with removable bundle.
- E. Shell Materials: Steel.
- F. Head:
 1. Materials: Cast iron.
 2. Flanged and bolted to shell.
- G. Tube:
 1. Seamless copper tubes.
 2. Tube diameter is determined by manufacturer based on service.
- H. Tubesheet Materials: Steel.
- I. Baffles: Steel.
- J. Piping Connections: Factory fabricated of materials compatible with heat-exchanger shell. Attach tappings to shell before testing and labeling.
 1. NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
 2. NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
- K. Support Saddles:
 1. Fabricated of material similar to shell.
 2. Fabricate foot mount with provision for anchoring to support.

2.2 GASKETED-PLATE HEAT EXCHANGERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alfa Laval Inc.
 2. API Heat Transfer Inc.
 3. Polaris Plate Heat Exchangers.
 4. ITT Corporation; Bell & Gossett.
 5. Armstrong Pumps, Inc.
- 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.
- C. Construction: Unit to be tested and stamped by a 3rd party and have “An ASME code stamp”
- D. Plate heat exchangers shall be certified according to AHRI standards 400 and listed on AHRInet.org site.
- E. Frame:
1. Capacity to accommodate 20 percent additional plates.
 2. Painted carbon steel with provisions for anchoring to support.
- F. Top and Bottom Carrying and Guide Bars: Painted carbon steel, aluminum, or stainless steel.
- G. End-Plate Material: Painted carbon steel.
- H. Tie Rods and Nuts: Steel or stainless steel.
- I. Plate Material: 0.024 inch (0.6 mm) thick before stamping; Type 304 stainless steel.
- J. Gasket Materials: Glue free Nitrile rubber up to 200 degrees and EPDM rubber above 200 degrees.
- K. Piping Connections: NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1.
1. NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
- L. Enclose plates in solid aluminum or stainless-steel removable shroud.

2.3 BRAZED-PLATE HEAT EXCHANGERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alfa Laval Inc.
 - 2. API Heat Transfer Inc.
 - 3. Armstrong Pumps, Inc.
 - 4. ITT Corporation; Bell & Gossett.
 - 5. Mueller, Paul, Company.
 - 6. Polaris Plate Heat Exchangers.

- B. Configuration: Brazed assembly consisting of embossed or pressed stainless-steel plates brazed together and two end plates, one with threaded nozzles and one with pattern-embossed plates.

- C. Construction: Fabricate and label heat exchangers to comply with ASME Boiler and Pressure Vessel Code, Section VIII, "Pressure Vessels," Division 1.

- D. End-Plate Material: Type 316 stainless steel.

- E. Threaded Nozzles: Type 316 stainless steel.

- F. Plate Material: Type 316 stainless steel.

- G. Brazing Material: Copper

2.4 HEAT TRANSFER PACKAGE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. API Heat Transfer Inc.
 - 2. Armstrong Pumps, Inc.
 - 3. ITT Corporation; Bell & Gossett.
 - 4. TACO Incorporated.

- B. Furnish and install Heat Transfer Package(s) of size and capacity as shown on the Drawings.
 - 1. The Heat Transfer Package shall be factory assembled including heat exchanger, air separation apparatus, pump, motor, triple duty check valve, relief valve, reducing valve, temperature and pressure gauges, frame, interconnecting piping and condensate trap assembly. Automatic steam control valve(s) will be furnished under Automatic Temperature Control Section of the Specifications. All piping will be subjected to a hydrostatic test (at 10% below relief valve

setting) after final assembly. Entire package shall be factory painted with one coat of grey paint. Entire unit shall have a performance guarantee when installed and operated in accordance with manufacturer's instructions.

2. Heat Exchanger: Meet requirements in Shell and Tube Heat Exchanger article above.
3. Air Separator, Triple Duty Valve, Compression Tank, Inter-connecting piping: Comply with requirements in Section 232113 – Hydronic Piping.
4. Circulating Pump: Comply with requirements in Section 232123 – Hydronic Pumps.
5. Valves: Comply with requirements in Section 230523 – General Duty Valves for HVAC Piping, and 232213 – Steam and condensate heating Piping,
6. Complete unit shall be constructed for 125 psig (Podium systems), 300 psig (hotel systems) working pressure. The tank fitting shall be an Airtrol Tank Fitting for proper air control of compression tank. Unit shall include a manual vent tube for establishing the proper air volume in the compression tank on initial fill.
7. Frame and Interconnecting Piping: The frame shall be of heavy duty channel and angle iron construction. The interconnecting piping shall be all ferrous schedule 40 black steel pipe as hereinbefore specified. Piping shall be so arranged as to permit easy removal of heat exchanger tube bundle. Pump suction shall be fitted with a gate valve or butterfly valve.

2.5 SOURCE QUALITY CONTROL

- A. Hydrostatically test heat exchangers to minimum of one and one-half times pressure rating before shipment.
- B. Heat exchangers will be considered defective if they do not pass tests and

inspections PART 3 - EXECUTION

3.1 SHELL-AND-TUBE HEAT-EXCHANGER INSTALLATION

- A. Heat-Exchanger Supports: Use factory-fabricated steel cradles and supports specifically designed for each heat exchanger.

3.2 GASKETED-PLATE HEAT-EXCHANGER INSTALLATION

- A. Install gasketed-plate heat exchanger on concrete pad.
- B. Install metal shroud over installed gasketed-plate heat exchanger according to manufacturer's written instructions.

3.3 CONNECTIONS

- A. Comply with requirements for piping specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Comply with requirements for steam and condensate piping specified in Division 23 Section "Steam and Condensate Heating Piping."
- C. Maintain manufacturer's recommended clearances for tube removal, service, and maintenance.
- D. Install piping adjacent to heat exchangers to allow space for service and maintenance of heat exchangers. Arrange piping for easy removal of heat exchangers.
- E. Install shutoff valves at heat-exchanger inlet and outlet connections.
- F. Install relief valves on heat-exchanger heated-fluid connection and install pipe relief valves, full size of valve connection, to floor drain.
- G. Install vacuum breaker at heat-exchanger steam inlet connection.
- H. Install hose end valve to drain shell.
- I. Install thermometer on heat-exchanger inlet and outlet piping, and install thermometer on heating-fluid inlet and outlet piping. Comply with requirements for thermometers specified in Division 23 Section "Meters and Gages for HVAC Piping."
- J. Install pressure gages on heat-exchanger and heating-fluid piping. Comply with requirements for pressure gages specified in Division 23 Section "Meters and Gages for HVAC Piping."

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
- B. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

- C. Heat exchanger will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

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 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain heat exchangers.

END OF SECTION 235700