SECTION 23 57 00
HEAT EXCHANGERS FOR HVAC

PART 1 - GENERAL

1.1 STIPULATIONS

A. The specifications sections "General Conditions to the Construction Contract", "Special Conditions" and "Division 01 - General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 SUMMARY

A. This Section includes heat exchangers for HVAC applications.

1.3 ACTION SUBMITTALS

A. Product Data: Include rated capacities at the required fluid temperatures and flow rates; pressure drops; materials; shipping, installed, and operating weights; furnished specialties; and accessories for each type of product indicated. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. 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 designing bases and support frames.
2. Base and Support Frame Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.

C. Delegated-Design Submittal: Details and design calculations for steel support frames for heat exchangers. Refer to requirements in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment".

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Equipment room, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Tube-removal space.
2. Structural members to which heat exchangers will be attached.

B. Source quality-control reports.

C. Field quality-control reports.

D. Sample Warranty: For manufacturer's warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For heat exchangers to include in maintenance manuals.

1.6 QUALITY ASSURANCE

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

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of domestic-water heat exchangers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Structural failures including heat exchanger, storage tank, and supports.
    b. Deterioration of metals, metal finishes, and other materials beyond normal use.
    c. Leakage of tubes, gaskets, or tube sheets.

2. Warranty Periods: From date of Substantial Completion.

    a. Shell-and-Tube Heat Exchangers: Three (3) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Shell-and-Tube Heat Exchangers:

    a. Armstrong Fluid Technology
    b. Bell and Gossett; Div. of Xylem Inc.
    c. DHT, Diversified Heat Transfer Inc.
    d. Taco, Inc.
    e. Thrush Co. Inc.
    f. Or equal as approved by the Professional.

2.2 SHELL-AND-TUBE HEAT EXCHANGERS (STEAM-TO-WATER)

A. Provide removable U-tube type instantaneous heat exchangers, complete and arranged to affect heat transfer from saturated steam to hot water for the hot water heating system.

B. Capacities for shell and tube heat exchangers shall be based on 0.0005 fouling factor for both shell and tube side, or as scheduled on the Drawings, whichever is larger.

C. Heat exchangers shall be selected for a maximum water velocity in the tubes of 6 feet per second.

D. Heat exchangers shall be designed so that water will flow through the tubes and steam will condense in the shell. Each heat exchanger shall be complete with 3/4" O.D. No. 20 gauge (0.035" thick) seamless drawn copper tubes and brass baffles, cast iron or steel supporting saddles, cast iron head, rolled steel tube sheet, and fabricated carbon steel shell.

1. The shell shall be of the extended type to place the steam supply inlet completely clear of the end of the tube bundle.

E. Saddles shall be supported on structural steel as shown on the Drawings and specified. Support steel shall be primed and painted.

F. Each heat exchanges shall be built for 150 psi working pressure at 375 deg F. and tested at 300 psi and shall be constructed and installed in accordance with the ASME Code for Unfired Pressure Vessels.

1. The ASME "U" symbol shall be stamped on the heat exchanger.

G. Connections: Heat exchangers shall have tappings for steam, return, safety valve, water inlet and outlet, pressure gauge and air valve connection at end. ASME relief valve, pressure gauge, air vent and piping accessories shall be furnished and installed at each converter. Relief valve at each converter shall be complete with test lever. Drain at each converter shall be extended to funnel or floor drain. Converter connections shall be either flanged or screwed ends. Flanged connections shall be provided on the converters for piping 2-1/2" and larger.

H. Safety valve vent lines shall be extended to the exterior of the building in accordance with the requirements of local regulatory agencies having jurisdiction.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect heat exchangers according to ASME Boiler and Pressure Vessel Code, Section VIII, "Pressure Vessels," Division 1. Affix ASME label.

B. Hydrostatically test heat exchangers to minimum of 1.3 times pressure rating and flush clean and blow dry before shipment.

C. Heat exchangers will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

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.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 HEAT EXCHANGER INSTALLATION

A. Install heat exchangers according to manufacturer's written instructions.

B. Install shell-and-tube heat exchangers on saddle supports and structural steel with provisions to drain shell. Anchor support frames to the slab.

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 and maintenance. Install piping connections to allow service and maintenance of heat exchangers, including the removal of the tube bundle, which shall only require the removal of two close-coupled elbows or the removal of a single elbow and a plain section of pipe no longer than 12" on each head piping connection.

C. Install piping with threaded, studded port, grooved end**,** or flanged connections at heat exchangers.

D. Install shutoff valves at heat exchanger inlet and outlet connections.

E. Install relief valves on heat exchanger heated-fluid connection and pipe the outlet of relief valves, full size of valve connection, to floor drain.

F. Install vacuum breaker at heat exchanger steam inlet connection, downstream of the control valve.

G. Install hose end valve to drain shell.

3.4 CLEANING

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

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Verify that heat exchangers are installed and connected according to the Contract Documents.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Adjust flows and controls to deliver specified performance.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Heat exchanger will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train the Client Agency's maintenance personnel to adjust, operate, and maintain heat exchangers as specified below:

1. Train Client Agency's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining heat exchangers.
2. Review data in maintenance manuals.
3. Schedule training with Client Agency, through Architect, with at least seven days' advance notice.

END OF SECTION