PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The requirements of the General Conditions, Supplementary Conditions and the following Specification sections apply to all Work herein:
1. Section 23 00 10 - General Requirements
2. Section 23 00 20 - HVAC Scope of Work
3. Section 23 05 07 - Design Conditions
4. Section 23 05 48 - Vibration Isolation
5. Section 23 05 93 - Testing, Balancing and Adjusting
6. Section 23 07 00 - Thermal Insulation
7. Section 23 21 13 - Pipes, Valves, Fittings, and Accessories
8. Section 23 25 00 - Water Treatment Systems

1.2 SUMMARY

A. Furnish and install liquid-to-liquid heat exchangers as specified herein and as indicated on the Drawings.

1.3 REFERENCE STANDARDS

A. All equipment shall be designed, manufactured and tested in accordance with the latest applicable industry standards including the following:
1. AHRI Standard 400-2001 with Addendum 2
2. OSHA
3. Energy Policy Act of 1992 (EP Act)
4. ASTM E-84 and E-119
5. NFPA 225
6. UL 723

B. All equipment and material to be furnished and installed on this Project shall be UL or ETL listed, in accordance with the requirements of the authorities having jurisdiction, and suitable for its intended use on this Project.

1.4 SUBMITTALS

A. The following submittal data shall be furnished according to the General Conditions and Section 21 00 10 and shall include, but not be limited to:
1. Plate Type Liquid-to-Liquid Heat Exchangers* complete with physical dimensions, materials, ARI certified capacity data, water pressure drop, connection details, etc.
2. Plate Type Heat Exchanger Insulation Package complete with physical dimensions, materials, drip pan, multiple side and roof panels, construction details, installation instructions, etc.
3. Heating Hot Water Heat Exchangers* including construction materials, physical dimensions, capacity data, water pressure drop, etc.
4. Prior to execution of factory testing and lab testing, submit test procedures, recording forms, and test equipment cut sheets to Engineer for review. Refer to Section 23 00 20 titled “Scope of Work” for “Scheduling Procedures”.
5. Factory Test Schedule.
6. Factory Hydrostatic Test Reports.
7. Factory Performance Test Reports.
8. Field Test Schedule.
9. Filed Test Reports.

B. All items or equipment listed above with asterisks (*) shall be certified by the manufacturer using Manufacturer Certification “MCA” as set forth in Section 23 00 10. See Section 23 00 10 for certification requirements.

1.5 WARRANTY

A. Comply with the requirements of the General Conditions and Section 23 00 10.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. If they comply with these Specifications, plate type liquid-to-liquid heat exchangers manufactured by one of the following manufacturers will be acceptable:
1. Alfa-Laval
2. APV, SPX Corporation
3. Baltimore Air Coil
4. Bell & Gossett
5. Mueller
6. Polaris
7. Taco
8. Tranter

B. If they comply with these Specifications, water-to-water shell and tube heat exchangers for the heating hot water system manufactured by one of the following manufacturers will be acceptable:
1. American Standard TEMA Type AFL
2. Bell & Gossett
3. Patterson-Kelley Company
4. Taco
5. YULA

2.2 PLATE FIN HEAT EXCHANGERS

A. Furnish and install where shown on the Drawings, plate type heat exchangers . Capacities shall be as listed in the “Schedule of Capacities” on the Contract Documents. A corporate officer of the manufacturer shall certify the guarantee and the submittal data as specified in Section 23 00 10. The manufacturer shall take whatever steps are necessary to meet the guarantee capacity at no additional cost to the Owner, regardless of the extent of the revisions required.

B. Plate type heat exchangers shall be certified according to AHRI Standard 400-2001 with Addendum 2, with 0% heat transfer tolerance (95% capacity will not be acceptable). Each heat exchanger shall produce 100% of the specified heat transfer at the flows and temperatures listed in the “Schedule of Capacities”. Each unit shall be listed with AHRI by model number. Model number and surface area must be listed on all submittal data sheets. Measured values for flow and pressure drop tolerance shall be allowed.

C. Plate type heat exchangers shall be assembled, leak tested and pressure tested at the scheduled design working pressures. The plate type heat exchangers shall be hydrostatically tested and leak tested at the factory with all the plate in the assembled unit. Heat exchangers shall be designed, fabricated and tested for operation in accordance with the ASME Unfired Pressure Vessel Code, Section VIII, Division I and shall be code stamped to indicate compliance.

D. Plate type heat exchangers shall be freestanding with unitized frame. Frame shall be sized to allow both opening and cleaning plate packs. Frame length shall be sized to allow the future installation of 25% more plates. Frame shall be provided with top and bottom guide bars for support and alignment of plates. Frame heads shall provide even pressure to the plate pack.

E. Fixed and movable end frames shall be reinforced flat plate carbon steel epoxy painted. Movable frame shall be supported from the top bar and guided by the bottom bar. End frames shall be provided with holes for lifting with bar. Provide three (3) steel floor base plates for anchor bolts. Provide tightening bolts of zinc plate carbon steel with nuts and washers.

F. Plates shall be fabricated of 304 or 316 stainless steel. Plate pattern and geometry shall be suitable for the application with alternate plates rotated 180°. All plates shall have internal metal contact without the

addition of corrugated flat plates. Plate thickness shall withstand operating pressure on either side without leaking or failing. Plate design shall include a groove for the entire gasket with tapered sides for sealing and the groove shall be configured to prevent gasket blowout. End plates shall be provided at the fixed and movable frames.

G. Port connections shall be flanged or studded type for ports of 4" diameter and larger. Ports smaller than 4" in diameter may be screwed or studded. Ports shall be arranged as indicated on the Drawings. Connections and gaskets shall be rated at 150 psig, 300 psig, or 400 psig, as indicated in the "Schedule of Capacities" on the Contract Documents.

H. Gaskets shall be molded one (1) piece of NBR EPDM, or Nitril material. Gaskets shall be locking or cemented into the continuous deep gasket groove and shall seal with the tightening of the pack. Inactive port gasket areas shall be vented to the outside to prevent mixing.

I. The plate pack shall be completely enclosed in a stainless steel, aluminum or painted removable metal protective shrouds, which complies with all applicable OSHA requirements. Units provided with factory built interlocking 2" insulated panels shall not require a protective shroud over the plate pack.

J. End plates, plate pack enclosure, and frame shall be field insulated. Insulation shall be specified in Section 23 07 00 "Thermal Insulation". Insulation on the plate pack enclosure shall be installed to allow the removal of the enclosure without destroying the insulation. Manufacturer to provide recommendations and directions.

K. Furnish and install a factory built removable and reusable insulation system consisting of 2" thick foam filled panels with aluminum inner and outer skin, latches and gaskets. Side and top panel outer skins shall be minimum 0.040" aluminum. Each panel shall be permanently marked identifying its location (e.g.; "Front", "Top", "Right", "Left", "Back", etc.). Each heat exchanger insulation package shall include an insulated 304 stainless steel drain pan, sized for the entire heat exchanger and all required insulated enclosure panels to sit inside the drain pan. The enclosure shall be sized to cover the entire free standing frame, without modifications for 25% future expansion of the plate pack. Insulated drain pan, wall panels, and top panels shall be shipped separate and unassembled from the plate type heat exchanger to minimize risk of damage to panels. Insulation package shall be field assembled per the manufacturer's recommendations using all gaskets, seals, FSK tapes, sealants, etc. as required to provide a vapor tight enclosure.

L. After factory hydrostatic testing, copies of test reports shall be sent to the Engineer and Owner. The unit shall be shipped and installed assembled.

M. The manufacturer's submittal shall list at least the following performance criteria:
1. Plate arrangement.
2. Number of plates.
3. Effective heat surface (sq. ft.).
4. Log Mean Temperature Difference (LMTD).
5. Corrected Log Mean Temperature Difference (CLMTD), if applicable.
6. Number of Transfer Units (NTU).
7. Overall K-value.
8. Fouling factor for hot side and cold side.
9. Amount of additional capacity above that specified.

PART 3 EXECUTION

3.1 INSTALLATION

A. All equipment shall be installed in accordance with the latest industry standards, per the manufacturer's recommendations, and as indicated on the Drawings.

3.2 FACTORY TESTING

A. All heat exchangers shall be tested in accordance with the latest applicable industry standards and as specified herein.

B. Heat exchangers shall be factory tested at full load (100%) to ensure that the units are in compliance with AHRI Standard 400-2001 with Addendum 2, for capacity and efficiency performance. Factory test shall be witnessed by the Owner and Engineer. Heat exchangers shall be rated as per AHRI Standard 400-2001 with Addendum 2, and shall produce 100% of the specified capacity (0% AHRI tolerance on heat transfer). Cold side and hot side water pressure drop tolerances shall be allowed and shall not be more than 10% greater than the specified pressure drop at design conditions.

C. For identical heat exchanger units, only one (1) unit need be factory tested.

D. Certified factory test reports signed by a corporate officer shall be submitted to the Engineer and Owner within two (2) weeks of factory testing. The heat exchanger manufacturer shall use the manufacturer certification “MCA” as set forth in Section 23 00 10. See Section 23 00 10 for certification requirements.

3.3 FIELD TESTING

A. Prior to execution of field testing, submit test procedures, recording forms, and test equipment cut sheets to Engineer for review. Refer to Section 23 00 20 titled “Scope of Work” for “Scheduling Procedures”.

B. Refer to Section 23 05 93 for additional testing requirements for miscellaneous equipment.

END OF SECTION