SECTION 23 81 46

WATER-SOURCE UNITARY HEAT PUMPS

1.0 GENERAL

1. DESCRIPTION
   1. All work specified in this Section is governed by the Common Work Results for HVAC Section 23 05 00.
   2. This Section 23 81 46 and the accompanying drawings cover the provision of all labor, equipment, appliances and materials, and performing all operations in connection with the construction and installation of the water-source heat pump units as specified herein and as shown. This work includes, but is not limited to, the following:
      1. Water-source heat pump units
      2. Control system (interlocked to heat pump units)

* 1. Heat pumps shall be self-contained, automatic, packaged heat pumps. These units shall be completely factory-assembled as unitary packages complete with operating controls, internally wired and fully charged with refrigerant. Only one electrical power connection shall be required for each unit.

1. INTENT
   1. It is the intent of this Section of the specifications to provide complete, operable, adjusted heat pump units, as shown and specified, which operate efficiently and automatically, and are free of excessive noise and vibration.
2. BASIS OF DESIGN
   1. The basis of design is as scheduled. Acceptable substitute manufacturers are Trane, Daikin, Carrier, Aaon, ClimateMaster, and Bosch, provided that they are equal in all respects to the units indicated and specified for this project. Any other proposed substitutions shall be submitted in accordance with the prior approval requirements.

2.0 PRODUCTS

1. UNIT CASINGS
   1. Heat pump casings shall be formed, galvanized steel construction with welded assembly. Galvanized steel surfaces shall be zinc coated, heavy gauge.
   2. Unit casings shall have ½” fiberglass interior insulation. Insulation exposed to the airstream shall be coated.
   3. Unit casing shall be complete with discharge duct collar and filter rack for 1” or 2” filters.
2. REFRIGERATION SYSTEM
   1. Compressor: Compressor(s) shall be direct drive, 3600 RPM, hermetic reciprocating type with centrifugal oil pump, crankcase heater and internal pressure relief valve. Compressor(s) shall have internal vibration isolation and sound muffling. Anti-recycle timers shall be provided to prevent excessive cycling of compressors through utilization of a 5 minute time shut down of unit on interruption of power, controlled shutdown and automatic defrost system. Compressor shall have thermal overload protection. Dual compressors shall be provided on units 6 tons nominal and over.
   2. Water-to-refrigerant heat exchanger: Shall be of a high quality co-axial coil. The copper coil shall be deeply fluted. The coil shall have a working pressure of 450 psig on the refrigerant side and 400 psig on the water side.
   3. Reversing Valve: The reversing valve shall be a pilot operating sliding piston-type with replaceable encapsulated magnetic coil. This valve shall be energized in cooling.
   4. Tubing: The refrigerant tubing shall be 99% pure copper. The system shall be free from contaminants. All refrigerant and water lines inside the unit shall be insulated with elastomeric closed-cell insulation.
   5. The refrigerant access ports shall be factory-supplied on the high and low pressure sides for easy refrigerant pressure or temperature testing.
   6. Refrigerant Metering: The unit shall have a thermal expansion valve. Capillary tubes may only be used if the Unit Manufacturer provides a water-regulating valve.
   7. Air-to-Refrigerant Coil: The coil shall be copper tubing mechanically bonded to heavy duty aluminum fins, evenly spaced. Aluminum tubes shall not be acceptable. All coils shall be factory leak-tested with 450 psig opening pressure and 125 psig helium. In addition, the tubes shall be completely evacuated of air prior to shipment. The refrigerant coil distributor assembly shall be orifice-style with round copper distributor tubes. The tubes shall be sized consistent with the coil capacity. Suction headers shall be fabricated from rounded copper pipe.
   8. \*\*Waterside Economizer: Where scheduled or noted, waterside economizer (WSE) coil shall be provided as an accessory to unit and include the required controls, valve, drain pan, etc. for waterside economizer operation and control. The WSE coil and drain pan shall match the construction of the WSHP. The WSE coil shall be proof and leak tested by the Manufacturer. The proof test shall be at 1.5 the maximum operating pressure and leak test at the maximum operating pressure.
   9. \*\*Hot Gas Reheat: Where scheduled or noted, hot gas reheat (HGRH) coil shall be copper tubes mechanically expanded into evenly-spaced aluminum fins. The HGRH coil shall be proof and leak tested by the Manufacturer. The proof test shall be at 1.5 the maximum operating pressure and leak test at the maximum operating pressure. Hot gas reheat mode shall be interlocked to space-mounted humidity sensor with adjustable setpoint.
   10. The unit shall be factory-charged and ready for operation.
3. CONTROLS AND ACCESSORIES
   1. Operating and safety controls must be factory-installed and include solid state compressor overload protection, magnetic contactor, solenoid operated switchover valve, thermostatic expansion valve, refrigerant line drier, fan and compressor cycling thermostats. A float-operated shutdown control shall be provided in the condensate pan to shut the unit down on high condensate level prior to overflow.
   2. \*\*A 24-volt transformer with integral circuit breaker shall be provided to accommodate an accessory 24-volt indoor electro-mechanical thermostat – 7-day programmable with automatic heat/cool night and weekend setback capabilities.
   3. \*\*A 24-volt transformer with integral circuit breaker to accommodate an accessory zone thermostat with setpoint and override button, and a communicating microprocessor. See Section 23 09 00 and coordinate with the Controls Contractor.
   4. A set of flexible supply and return hoses shall be provided with each unit. Coordinate with Section 23 21 00.
   5. Rubber-in-shear vibration isolator mounts shall be provided at each mounting point of the unit or the compressor and fan section may be internally isolated. In either case, the isolation shall be selected and provided by the Heat Pump Manufacturer.
   6. Units for cooling-only service, or cooling-only with electric heat, shall have the reverse refrigerant cycle disabled.
   7. Provide with integral refrigerant leak detector. Upon detection, fan shall be fully enabled.
4. FILTERS
   1. Units shall have scheduled filter or, where not scheduled or indicated, 1 inch low velocity glass fiber throwaway filters in commercially available sizes.

3.0 EXECUTION

1. INSTALLATION
   1. The heat pump units and associated controls shall be installed in strict accordance with the manufacturer's recommendations.
   2. The control system shall be completely wired under this Division 23. Wiring shall be in accordance with the NEC and shall meet all requirements for this installation.
2. STARTUP
   1. Provide the services of a factory-trained and qualified Service Technician employed by the Unit Manufacturer who shall inspect the installation including external interlock and power connections; supervise leak testing, initial operation, calibration of operating and safety controls and supervise electrical testing.
   2. This Service Technician shall forward a report in four (4) copies to the Owner when the units are in safe and proper operating condition. This report shall include all pressure and control settings, voltage readings per phase during start and run, and shall list minor discrepancies to be corrected that affect safe and reliable operation. One additional copy of the report shall be left in the central control panel. One copy of bound installation, operation, maintenance service and parts brochures, including applicable serial numbers, full unit description, parts ordering sources, shall be placed in the central control panel at the time of startup; four (4) additional copies shall be forwarded to the Owner.

END OF SECTION