WATER-TO-AIR HEAT PUMPS

1. GENERAL

1.1 Scope

.1 Water-to-air vertical style heat pumps. (HP-1)

.2 Accessories

1.2 Related Sections

.1 Section 01 33 00 - Submittal Procedures.

1.3 References

.1 Air-Conditioning, Heating and Refrigeration Institute (AHRI)

.1 AHRI 320, Standard for Water-Source Heat Pumps.

.2 National Fire Protection Association (NFPA)

.1 NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.3 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)

.1 ASHRAE Standard 15, Safety Standard for Refrigeration Systems.

1.4 Shop Drawings and Product Data

.1 Submit shop drawings in accordance with Sections 01 33 00 - Submittal Procedures.

.2 Indicate:

.1 Construction material specifications and construction details.

.2 Performance date in the form of tables, and unit selection points clearly indicated. Include EER and COP at the selected point.

.3 Electrical and controls wiring diagrams.

.4 Physical dimensions.

.5 Location of access panels.

.6 Installation instructions.

.7 Operating and maintenance instructions.

.8 Information on all accessories.

1.5 Warranty

.1 The refrigeration equipment manufacturer's warranty shall be for a period of five years from date of Total Performance. The warranty shall include parts and labour costs for the repair or replacement of defects in material or workmanship. The refrigerant warranty shall match the parts and labour warranty.

2. PRODUCTS

2.1 General:

.1 Vertical floor-mounted type, consisting of fan, air-to-refrigerant coil, compressor, 4-way reversing valve, water-to-refrigerant heat exchanger and controls.

.2 Units shall be supplied completely factory assembled, piped, internally wired, fully charged, capable of operation with an entering water temperature range from 12.8°F to 43.3°F. All equipment must be rated and certified in accordance with ASHRAE/ANSI/AHRI/ISO 13256-1, ETL, ETL and have correct AHRI/ISO and ETL labels mounted on side of the cabinets. Each unit shall be run tested at the factory.

2.2 Casing and Cabinet

.1 Fabricate from heavy gauge G-60 galvanised steel.

.2 Insulate interior side of cabinet with 15 mm thick, 24 kg/m^3 density, coated glass fibre.

.3 All fiberglass shall be coated and have exposed edges tucked under flanges to prevent the introduction of glass fibers into the air stream. All insulation must meet NFPA 90A requirements.

.4 Cabinet shall have separate holes and knockouts for entrance of electrical and control wiring.

.5 Units shall have a factory-installed duct flange on the discharge of the blower and must have a minimum of two access panels, one for the compressor compartment and one for the blower compartment.

.6 Unit shall have an insulated panel separating the blower compartment from the compressor compartment.

.7 Units are to ship with heavy metal brackets, rubber isolators, fasteners and washers to suspend and isolate the unit from the building.

.8 Provide a sloped drain pan with drain connection being flush mounted to the unit casing.

.9 Units shall be configured in the following airflow arrangements: Left Return/Top Discharge.

.10 Supply and return water connections shall be brass female pipe threaded (FPT).

2.3 Refrigerants

.1 Type of Refrigerant: R-410A.

2.4 Filter Rack and Filters

.1 Provide a field fabricated filter rack to accommodate a standard 50mm pleated filter.

.2 Filter shall have a minimum MERV 7 rating.

2.5 Refrigerant Circuit

.1 Units shall have a sealed refrigerant circuit, which includes a non-CFC depleting R-410A refrigerant and scroll compressor. In addition each unit will have a thermostatic expansion valve, an aluminum fin and copper tube refrigerant-to-air heat exchanger, a reversing valve and a water-to-refrigerant coaxial heat exchanger.

.2 The coaxial coils shall be made of copper and shall be deeply fluted to enhance heat transfer and minimize fouling and scaling. The coaxial coil shall have a working pressure of 400 psig on the waterside of the unit and 500 psig on the refrigerant side for all R-410A units.

.3 Refrigerant metering shall be regulated by a thermostatic expansion valve (TXV) only.

.4 Reversing valve shall be four-way solenoid activated refrigerant valve, which fails in the cooling “dominant” operation.

.5 Safety controls include a high-pressure switch, a low-pressure switch and a low refrigerant temperature sensor.

.6 Refrigerant gauge access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service.

.7 Activation of any safety switch shall prevent the compressor from operating.

.8 Units shall be capable of being reset only by interrupting the power supply to the unit. Unit shall not be able to be reset from the wall thermostat.

2.6 Drain Pan

.1 The condensate pan shall be constructed of high impact IAQ, High Density Polyethylene (HDPE) plastic to prevent corrosion and sweating.

.2 The bottom of the drain pan shall be sloped on two planes to provide complete drainage of water from the pan.

.3 The water source heat pump unit shall be supplied with standard solid-state electronic condensate overflow protection.

2.7 Fan and Motor Assembly

.1 Units shall have a direct drive centrifugal fan. The fan housing shall have a removable orifice ring to facilitate fan motor and fan wheel removal.

.2 The fan housing shall protrude through the cabinet to facilitate field supply duct connection.

.3 The standard fan motor shall be PSC type isolated from the fan housing and shall have internal thermal overload protection.

.4 Units shall have a terminal strip mounted on the fan motor to facilitate motor speed change.

.5 The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule.

2.8 Electrical

.1 A control box shall be located within the unit and shall contain controls for compressor, reversing valve and fan motor operation and shall have a suitably sized transformer and a terminal block for low voltage field wiring connections.

.2 Unit shall be name-plated to accept time delay fuses or HACR circuit breaker for branch over-current protection of the power source.

.3 Unit control system shall provide heating or cooling as required by the set points of the wall thermostat.

.4 The unit control scheme shall provide for fan operation simultaneous with compressor operation (fan interlock) regardless of the thermostat type.

.5 The unit shall be capable of providing an output signal to an LED on the thermostat or to a central monitoring panel to indicate a “fault” condition from the activation of any one of the safety switches.

2.9 Controls

.1 Unit shall have a microprocessor- based control system. The unit control logic shall provide heating and cooling operation as required by the wall thermostat set point. The control system shall provide the following for stand-alone operation:

.1 The use of standard non-programmable or programmable wall thermostats.

.2 Fan operation simultaneous with the compressor (fan interlock) regardless of thermostat logic.

.3 Time delay compressor operation.

.4 Delayed de-energizing of the reversing valve for quiet reversing valve operation.

.5 Compressor short cycle protection of a minimum of three minutes before restart is possible.

.6 Random unit start-up after coming off on unoccupied mode.

.7 Single grounded wire connection for activation of the unoccupied or unit shutdown modes.

.8 Night setback temperature setpoint input signal from the wall thermostat.

.9 Override signal from wall thermostat to override unoccupied mode for 2 hours.

.10 Brownout protection to suspend unit operation if the supply voltage drops below 80% of normal.

.11 Condensate overflow protection to suspend cooling operation in an event of a full drain pan.

.12 Suspended compressor operation upon activation of the refrigerant pressure switch(es).

.13 Cooling operation activated for 60 seconds upon activation of the low suction temperature sensor - defrost cycle.

.14 Method of defeating compressor, reversing valve and fan time delays for fast service diagnostics.

.15 Remote reset - Provides means to remotely reset automatic lock-outs generated by high/low pressure faults and/or low temperature faults.

.16 Fault Retry clears faults the 1st two times they occur within a 24-hour period and triggers automatic lock-out on 3rd fault.

2.10 Accessories

.1 Thermostat

.1 Programmable Electronic Thermostat Two-stage heat/Two-stage cool, 7-day programmable, hardwired (no batteries required) with clear backlit display for easy viewing. Subbase shall have system "Mode/Prog" and fan "Auto/On" switches.

3. EXECUTION

3.1 Installation

.1 Install where indicated and in accordance with manufacturer's instructions.

.2 To reduce noise emissions, install a field-provided 1/2 inch thick, isolator pad below the entire base of the vertical unit. The pad should be equal to the overall foot-print size of the unit to provide sound dampening of the unit while in operation.

.3 Make duct connections through flexible connections.

.4 Level unit with fans running. Align ductwork. flexible connections. Misalignment with fan stopped not to strain or damage flexible connection.

.5 Make piping connections.

.6 Nothing to obstruct ready access to components or to prevent removal of components for servicing.

3.2 Drain Pans

.1 Install so that no water can accumulate and arrange for easy access for cleaning.

3.3 Start-Up and Commissioning

.1 Manufacturer to certify installation.

.2 Manufacturer to be present during start-up, test and start up units and certify performance.

.3 Manufacturer to provide verbal, and written instructions to operating personnel.

3.4 Performance

.1 Refer to Section 23 06 00 – Schedules for HVAC.

END OF SECTION