EC Model Packaged Units & Split Systems Guide Specifications

General

Furnish and install FHP water source heat pumps as indicated on the plans with capacities and characteristics as listed in the schedule and the specifications that follow. The units shall be manufactured in an ISO 9001 certified facility.

Horizontal/Vertical Package and Split System Water Source Heat Pumps

Units shall be designed to operate throughout the range of entering fluid temperature of 50°F to 110°F in the cooling mode and 50°F to 80°F in the heating mode. Units shall have an operating range of 50°F to 110°F in the cooling mode and 25°F to 80°F in the heating mode when equipped with the optional extended range package. Equivalent units from other manufacturers can be proposed provided approval to bid is given 10 days prior to bid closing. All equipment with a nominal capacity of 135,000 BTUH Total Cooling or lower must be listed in the current AHRI Applied Equipment Directory under the AHRI Standard AHRI/ISO- 13256-1, WLHP, GWHP and GLHP certification points.

All equipment in this section must meet or exceed the DOE mandated minimum EER's and COP's as listed in ASHRAE 90.1.

Basic Construction

Units shall have the air flow arrangement as shown on the plans. If units with these arrangements are not used, the contractor supplying the water source heat pumps is responsible for any extra costs incurred by other trades and must submit detailed mechanical drawings showing ductwork requirements and changes or relocation of any other mechanical or electrical system. If other arrangements make servicing difficult the contractor must provide access panels and clear routes to ease service. The architect must approve all changes 10 days prior to bid.

All units shall have stainless steel drain pans to comply with this project's IAQ requirements. Painted/coated steel or plastic material shall not be permitted.

All water source heat pumps shall be fabricated from heavy-gauge sheet metal steel. All interior surfaces shall be lined with ½" thick, multi density acoustic insulation. Insulation within the air handling section shall not have any exposed edges. All insulation must meet NFPA 90A, UL 181 and be certified to meet the GreenGuard™ Indoor Air Quality Standard for Low Emitting Products.

One blower access panel and two compressor compartment access panels shall be removable with supply and return air ductwork in place.

Unit compressors shall have rubber isolators to the prevent transmission of vibration to the structure.

All units shall have a factory installed two sided filter rack capable of accepting one inch filters. Units shall have a 1" thick throwaway type glass fiber filter as standard. The filter rack shall incorporate a 1" duct flange. The contractor shall purchase one spare set of filters and replace factory-shipped filters upon completion of start-up.

Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring. Supply and return water connections shall be copper FPT fittings and shall be securely mounted flush to the cabinet allowing for connection to a flexible hose without the use of a back-up wrench. Water connections which protrude through the cabinet shall not be allowed.

Condensate overflow protection shall be provided as standard for horizontal and vertical package units.

Fan and Motor Assembly

The fan(s) shall be belt driven DWDI forward curved type with dynamically balanced wheel(s). The fan motor(s) shall be 1725 or 3450 RPM 56 frame sealed ball bearing type.

The motor(s) shall be permanently lubricated and have thermal overload protection.

The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule. External static pressure rating of the unit shall be based on a wet coil. Ratings based on a dry coil shall NOT be acceptable.

Refrigerant Circuit

Units shall use R-410A refrigerant. Units that use R-22 refrigerant shall not be allowed.

All units shall have a factory sealed and fully charged refrigerant circuit with the following components:

Hermetic compressor: Hermetic reciprocating, or scroll compressors shall be specifically designed for R-410A refrigerant and shall be internally sprung (if reciprocating), externally isolated and with thermal overload protection.

Refrigerant metering thermal expansion valves.

Finned tube refrigerant to air heat exchanger. Refrigerant to air heat exchangers shall utilize enhanced aluminum fins and rifled copper tube construction rated to withstand 600 PSIG refrigerant working pressure. All air coils shall have non-ferrous aluminum end plates.

DuoGuard™ Coil Protection System – A corrosion protection option for refrigerant to air heat exchangers that features tin plating of the copper tubing and coating of the aluminum fins with a protective film. The tin plating shall provide best in class protection of the copper tubing from formicary corrosion while the fin coating provides protection against salt spray and other corrosive elements. DuoGuard™ protected coils will exceed 1000 hours salt spray per ASTM standard B-117.

Reversing valve. Reversing valves shall be four-way solenoid activated refrigerant valves which shall fail to the heating operation should the solenoid fail to function. Reversing valves which fail to the cooling operation shall not be allowed.

Coaxial (tube in tube) refrigerant to water heat exchanger. Refrigerant to water heat exchangers shall be of copper inner water tube and steel outer refrigerant tube design rated to withstand 600 PSIG working refrigerant pressure and 400 PSIG working water pressure. Shell and Tube style refrigerant to water heat exchangers shall be treated as pressure vessels and shall require refrigerant pressure relief valves piped to the exterior of the building. The contractor supplying the water source heat pumps with Shell and Tube heat exchangers shall be responsible for any additional installation costs. Brazed Plate water to refrigerant heat exchangers shall require additional centrifugal separators added to the supply water piping at each unit. Each separator shall have an automated clean out valve piped to a waste line. The contractor supplying water source heat pumps with Brazed Plate heat exchangers shall be responsible for any additional costs.

Cupro-nickel water coil (option) – The refrigerant to water heat exchanger shall be of cupro-nickel inner water tube construction.

Safety controls including both a high pressure and low pressure switch shall be provided on both circuits. Temperature sensors shall not replace these safety switches. See the controls section of this specification for additional information.

Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service.

Activation of any safety device shall prevent compressor operation via a lockout circuit, in the affected circuit. The lockout circuit shall be reset at the thermostat or at the contractor supplied disconnect switch. Units which may be reset at the disconnect switch only shall not be acceptable. Refer to solid state safety circuit below. A condensate alarm on package units shall prevent both compressors from operating.

Service valves on split system condensing section must incorporate a Schrader service port to facilitate field service.

Electrical

A control box shall be located within the unit and shall contain a transformer, controls for the compressor, reversing valve and fan motor operation and shall have a terminal block for low voltage field wiring connections. The transformer shall be rated for a minimum 75VA. All units shall be nameplated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 volts.

Solid State Safety Circuit

All package units and condensing sections shall have a solid-state UPM safety control circuit with the following features:

Freeze Protection: the standard freeze protection sensor shall be mounted close to the water coil to monitor refrigerant temperature between water coil and the thermal expansion valve for all horizontal and vertical package units. If the refrigerant temperature between the expansion device and water coil drops below or remains at 26˚F for 30 seconds, the controller shall shut down the compressor and enter into a soft lockout condition. This trip point can be changed to 15˚F by cutting the R17 and R77 resistors located above the DIP switch SW1 for applications that employ antifreeze. The freezestat may not provide protection in the case of loss of flow in the heating mode. A flow switch or pressure differential switch is recommended to prevent unit operation in case of loss of flow.

The refrigerant to air coil shall have a sensor mounted after the expansion valve to monitor refrigeration and temperature. Should the temperature drop below the set point, the compressor shall be disabled.

Condensate overflow protection: A condensate sensor shall activate the lockout circuit upon sensing a high level of condensate in the drain pan and immediately put the unit into a hard lockout.

Anti-short cycle time delay on compressor operation.

Random start on power up mode.

Brown out/Surge/Power Interruption protection.

Low Pressure Switch 120 second bypass timer.

Shutdown on high or low refrigerant pressure safety switch inputs, and shutdown for the optional freezestat or high level condensate sensor.

Alarm output which closes for selectable dry contact closure or 24 VAC remote fault indication.

Alarm output selectable for constant output for general alarm notification, or pulse output for annunciation of the specific fault alarm.

Reset unit at thermostat or disconnect.

Automatic intelligent reset. Unit shall automatically reset after a safety shut down and restart the unit after the anti-short cycle timer and random start timer expire. Should a fault re-occur within 60 minutes after reset, then a permanent lockout will occur. Reset attempts shall be selectable for either 2 or 4 tries. Condensate overflow shall put the unit into a hard lockout on the first fault.

Ability to defeat time delays for servicing.

A light emitting diode (LED) to indicate safety alarms shall be provided for each circuit. The LED shall annunciate the following alarms: high refrigerant pressure, low refrigerant pressure, low water temperature, a high level of condensate in the drain pan, or brown out/surge/ power interruption. The LED will display each fault condition as soon as the fault occurs. If a permanent lockout occurs, then the fault LED will display the type of ault until the unit is reset.

ETL listed, and RFI, ESD, and transient protected.

Options

Extra quiet construction: Optional compressor blankets shall be provided on units, for additional attenuation.

Hot Gas Reheat: Vertical or horizontal package units as noted on the schedule shall be equipped with optional Hot Gas Reheat (HGRH). HGRH shall be either on/off control or modulating as noted in the specifications.

On/Off HGRH shall be controlled by a humidistat connected to the unit H terminal and shall start the unit in the reheat mode should the humidity be above setpoint once the thermostat control is satisfied. Cooling or heating requirements shall take precedent over HGRH.

Modulating Hot Gas Reheat (MHGRH) shall be active during the cooling mode. A 0 - 10 VDC signal from a sensor located in the unit discharge air supply shall modulate the hot gas valve to maintain an adjustable preset leaving air temperature to the conditioned space.

Hot Gas Bypass: For vertical or horizontal package units as noted on the schedule, supply each unit with a UL listed and MEA listed modulating hot gas bypass valve with factory supplied and installed controls to prevent air coils from frost development by taking hot gas and bypassing the water coil and expansion device and reintroducing the hot gas into the refrigerant line prior to the air coil. The hot gas bypass valve shall maintain a minimum refrigerant suction pressure to allow for a light load cooling mode or a low entering air temperature cooling mode.

Water Differential Pressure Switch. Prevents unit operation if there is no fluid flow.

Water Side Economizer: water side economizer shall be completely installed at the factory, with water-to-air condensate drain pan(s), motorized 3 way valve, aqua stat, and all internal electric controls. Water side economizer shall be rated at 400 psi and UL listed.

Other Factory Installed Options:

- Relays
- Phase protection monitor
- Phase monitor
- Fire alarm/dual power
- Boilerless control

Hose Kits

All units shall be connected with hoses. The hoses shall be either 2 or 3 feet long, braided stainless steel, fire rated hoses complete with adapters. Non fire rated hoses are not acceptable. Optional ball valves with P/T ports, flow controller, Y strainer and electric valve shall be included as specified in the schedule.