SECTION 238126 - SPLIT-SYSTEM AIR-CONDITIONING UNITS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Alternate Bid 3:

1. Contractor Provide:

a. Split-system air-conditioning units consisting of separate evaporator-fan and compressor-condenser components.
b. Roof supports for outdoor condensing unit.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.1 QUALITY ASSURANCE

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

E. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

F. Units shall be designed to operate with HCFC-free refrigerants.

1.3 COORDINATION

A. Coordinate size, location, and connection details with roof curbs, equipment supports, and roof penetrations specified.

1.4 WARRANTY

A. Warranty: Provide one year warranty for entire unit (parts and labor). Provide five year

warranty for compressors (parts only).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Mitsubishi Electronics America, Inc.; HVAC Division.
2. Samsung.
3. Sanyo Fisher (U.S.A.) Corp..
4. Daikin.

2.2 CEILING-MOUNTING, EVAPORATOR-FAN COMPONENTS

A. Description: Indoor unit shall be a ceiling cassette fan coil unit, operable with R-410A refrigerant, equipped with an electronic expansion valve, for installation into the ceiling cavity and equipped with an air panel grille. It shall be connected to the corresponding outdoor condensing unit. It shall be a round-flow air distribution type, ivory white, impact resistant with a washable decoration panel. The supply air is distributed via motorized louvers which can be horizontally and vertically adjusted from 0° to 90°. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while inhibiting changes in room temperature when used with the programmable controller.

B. General:
1. The indoor unit shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
3. Both refrigerant lines shall be individually insulated from the outdoor unit.
4. Return air shall be through the concentric panel, which includes a resin net mold resistant filter.
5. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump shall provide up to 33-1/2” of lift.
6. The indoor units shall be equipped with a return air thermistor.
7. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
8. The voltage range will be 253 volts maximum and 187 volts minimum.

C. Unit Cabinet:
1. The cabinet shall be space saving and shall be located into the ceiling.
2. Three auto-swing settings shall be available to choose, which include standard, draft prevention and ceiling stain prevention.
3. The airflow of the unit shall have the ability to shut down outlets with multiple patterns allowing for simpler installation in irregular spaces.

4. Fresh air intake shall be possible by way of optional fresh air intake kit.
5. A branch duct knockout shall exist for branch ducting supply air.
6. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.

D. Fan:
1. The fan shall be direct-drive turbo fan type with statically and dynamically balanced impeller with three fan speeds available.
2. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz.
3. The airflow rate shall be available in three settings.
4. The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings to allow operation with the MERV 8 and 13 filter options.
5. The fan motor shall be thermally protected.

E. Filter:
1. The return air shall be filtered by means of a washable long-life filter with mildew proof resin.

F. Coil:
1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
3. The coil shall be a 2-row cross fin copper evaporator coil with 17 FPI design completely factory tested.
4. The refrigerant connections shall be flare connections and the condensate will be 1 -1/4 inch outside diameter PVC.
5. A condensate pan with antibacterial treatment shall be located under the coil.
6. A condensate pump with a 33-1/2 inch lift shall be located below the coil in the condensate pan with a built in safety alarm.
7. A thermistor will be located on the liquid and gas line.

G. Electrical:
1. A separate power supply will be required of 208-230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
2. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet).
3. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.

H. Control:
1. The unit shall have controls provided by manufacturer to perform input functions necessary to operate the system.
2. A full array of fault diagnostics shall be accessible via the wired remote controller.
3. The unit shall be compatible with interfacing with connection to BACnet and LonWorks networks or interfacing with connection to BMS system.

2.3 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS

A. General: The outdoor condensing unit is designed specifically for use with matched capacity

indoor evaporator units.

1. The outdoor unit shall be factory assembled and pre-wired with all necessary electronic and refrigerant controls. The refrigeration circuit of the condensing unit shall consist of a swing compressor, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4 way valve, distribution headers, capillaries, filters, shut off valves, service ports and suction accumulator.
2. Both liquid and suction lines must be individually insulated between the outdoor and indoor units.
3. The outdoor unit can be wired and piped with outdoor unit access from left, right, front or rear.
4. The system will automatically restart operation after a power failure and will not cause any settings to be lost, thus eliminating the need for re-programming.
5. The outdoor unit shall be modular in design and should allow for side-by-side installation with minimum spacing.
6. The following safety devices shall be included on the condensing unit; high pressure switch, control circuit fuses, fusible plug, high pressure switch, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.
7. Oil recovery cycle shall be automatic occurring 2 hours after start of operation and then every 8 hours of operation.
8. The outdoor unit shall be capable of cooling operation at 0°F dry bulb ambient temperature without additional low ambient controls.

B. Unit Cabinet:
1. The outdoor unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.

C. Fan: The condensing unit shall consist of two propeller type, direct-drive fan motors that have multiple speed operation via a DC (digitally commutating) inverter.
1. The fan shall be a horizontal discharge configuration.
2. The fan motor shall have inherent protection and permanently lubricated bearings and be mounted.
3. The fan motor shall be provided with a fan guard to prevent contact with moving parts.

D. Condenser Coil:
1. The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design to ensure highly efficient performance.
3. The heat exchanger on the condensing units shall be manufactured from Hi-X seamless copper tube with N-shape internal grooves mechanically bonded on to aluminum fins to an e-Pass Design.
4. The fins are to be covered with an anti-corrosion acrylic resin and hydrophilic film type E1.
5. The pipe plates shall be treated with powdered polyester resin for corrosion prevention. The thickness of the coating must be between 2.0 to 3.0 microns.

E. Compressor:
1. The compressor shall be variable speed (inverter) controlled which is capable of changing the speed to follow the variations in total cooling load as determined

by the suction gas pressure as measured in the condensing unit. In addition, samplings of evaporator and condenser temperatures shall be made so that the high/low pressures detected are read every 20 seconds and calculated. With each reading, the compressor capacity shall be controlled to eliminate deviation from target value.

2. The inverter driven compressor shall be of highly efficient reluctance DC (digitally commutating), hermetically sealed swing type.
3. Neodymium magnets shall be adopted in the rotor construction to yield a higher torque and efficiency in the compressor instead of the normal ferrite magnet type. At complete stop of the compressor, the neodymium magnets will position the rotor into the optimum position for a low torque start.
4. The capacity control range shall be 25-100%.
5. The compressor shall be equipped with a crankcase heater, high pressure safety switch, and internal thermal overload protector.
6. The compressor shall be mounted to avoid the transmission of vibration.

F. Electrical:
1. The power supply to the outdoor unit shall be 208-230 volts, 1 phase, 60 hertz +/- 10%.
2. The control voltage between the indoor and outdoor unit shall be 16VDC non-shielded, stranded 2 conductor cable.
3. The control wiring shall be a two-wire multiplex transmission system, thus simplifying the wiring operation.

2.4 ACCESSORIES

A. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends. Insulate with 1” flexible elastomeric insulation.

B. Drain Piping: Type L Copper piping with brazed connections. Insulate with ¾” flexible elastomeric insulation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install roof-mounting compressor-condenser components on equipment supports. Anchor units to supports with removable, cadmium-plated fasteners.

D. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Piping installation requirements per manufacturer's recommendations. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect condensate drain piping and route to nearest drain. Provide trap as required.

C. Install piping adjacent to unit to allow service and maintenance.

D. Ground equipment according to Section 26 05 26 - Grounding and Bonding for Electrical Systems.

E. Electrical Connections: Comply with requirements in 26 05 19 – Building Wiring & Cable, 26 28 16 – Enclosure Switches, and 26 29 13 – Enclosed motor Controllers for power wiring, switches, and motor controls.

3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 238126