

## SECTION 238126

### SPLIT-SYSTEM AIR-CONDITIONERS

#### PART 1 - GENERAL

##### 1.1 STIPULATIONS

- A. The specifications sections "General Conditions of the Construction Contract", "Special Conditions", and "Division 1 - General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

##### 1.2 SUMMARY

- A. Section includes split-system air-conditioning with heating capacity consisting of separate evaporator-fan and compressor-condenser components for the elevator machine room.
- B. Related Sections:
  - 1. Section 230923 "Direct Digital Control for HVAC" for integrating control of the split system air conditioners with the existing Johnson Metasys BAS.

##### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Warranty: Sample of special warranty.
- C. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

##### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE Compliance:
  - 1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
  - 2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Procedures," and Section 7 - "Construction and System Start-up."
- C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

## 1.5 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."
- B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

## 1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period:
    - a. For Compressor: Five year(s) from date of Substantial Completion.
    - b. For Parts: Five year(s) from date of Substantial Completion.
    - c. For Labor: Five year(s) from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by Mitsubishi Electric & Electronics USA, Inc.; HVAC Advanced Products Division.
  - 1. The above item has been approved by the Department as a Proprietary Item. No other item will be accepted. Article 9, Paragraph 9.6, Substitution of Materials, of the General Conditions to the Construction Contract does not apply to the above item.

### 2.2 INDOOR UNITS (5 TONS (18 kW) OR LESS)

- A. Wall-Mounted, Evaporator-Fan Components:
  - 1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Professional, and discharge drain pans with drain connection.
  - 2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 210/240.
  - 3. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.
  - 4. Fan: Direct drive, centrifugal.
  - 5. Fan Motors:
    - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
    - b. Multitapped, multispeed with internal thermal protection and permanent lubrication.

- c. Enclosure Type: Totally enclosed, fan cooled.
  - d. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
  - e. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
  - f. Mount unit-mounted disconnect switches on exterior of unit.
6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
7. Condensate Drain Pans:
- a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.
    - 1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
    - 2) Depth: A minimum of 1 inch (25 mm) deep.
  - b. Single-wall, stainless-steel sheet.
  - c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.
    - 1) Minimum Connection Size: NPS 1 (DN 25).
  - d. Pan-Top Surface Coating: Asphaltic waterproofing compound.
8. Air Filtration Section:
- a. General Requirements for Air Filtration Section:
    - 1) Comply with NFPA 90A.
    - 2) Minimum Arrestance: According to ASHRAE 52.1 and MERV according to ASHRAE 52.2.
    - 3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.
  - b. Disposable Panel Filters:
    - 1) Factory-fabricated, viscous-coated, flat-panel type.
    - 2) Thickness: 1 inch (25 mm).
    - 3) Dust-Holding Capacity: 3 lb. minimum.
    - 4) Initial Resistance: Per manufacturer's standards.
    - 5) Recommended Final Resistance: Per manufacturer's standards.
    - 6) Arrestance according to ASHRAE 52.1: 80.
    - 7) Merv according to ASHRAE 52.2: 5.
    - 8) Media: Interlaced glass fibers sprayed with nonflammable adhesive and antimicrobial agent.
    - 9) Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, and hinged; with pull and retaining handles.

## 2.3 OUTDOOR UNITS (5 TONS)

### A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Professional, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
  - a. Compressor Type: Scroll.
  - b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
  - c. Refrigerant Charge: R-410A.
  - d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 210/240.
3. Fan: Aluminum-propeller type, directly connected to motor.
4. Motor: Permanently lubricated, with integral thermal-overload protection.
5. Low Ambient Kit: Permits operation down to 45 deg F (7 deg C).
6. Mounting Base: Polyethylene.

## 2.4 ACCESSORIES

- A. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:
  1. Compressor time delay.
  2. 24-hour time control of system stop and start.
  3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
  4. Fan-speed selection including auto setting.
- B. Automatic-reset timer to prevent rapid cycling of compressor.
- C. 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.
  1. Provide manufacturer's standard branch box to enable one outdoor compressor to serve two indoor units.
- D. Drain Hose: For condensate.
- E. Additional Monitoring:
  1. Monitor constant and variable motor loads.
  2. Monitor variable-frequency-drive operation.
  3. Monitor economizer cycle.
  4. Monitor cooling load.
  5. Monitor air distribution static pressure and ventilation air volumes.

## 2.5 CAPACITIES AND CHARACTERISTICS

- A. Cooling Capacity:

1. Total: 60,000 Btu/h (kW).
  2. SEER: 14.0.
  3. EER: 14.0.
  4. Moisture Removal: 2 pints/h (L/h).
  5. Entering-Air Temperature:
    - a. Dry Bulb: 80 deg F (deg C).
    - b. Wet Bulb: 65 deg F (deg C).
  6. Leaving-Air Temperature:
    - a. Dry Bulb: 55 deg F (deg C).
    - b. Wet Bulb: 49 deg F (deg C).
- B. Indoor Unit:
1. Fan Motor Electrical Characteristics:
    - a. Volts: 208.
    - b. Phase: Poly.
    - c. Hertz: 60.
  2. Airflow: <Insert value> cfm (L/s).
- C. Outdoor Unit:
1. Type: Air cooled.
  2. Electrical Characteristics:
    - a. Volts: 208.
    - b. Phase: Poly.
    - c. Hertz: 60.
    - d. Minimum Circuit Ampacity: <Insert value>.
    - e. Maximum Overcurrent Protection: <Insert amperage>.
    - f. Fan Motor Full-Load Amperes: <Insert value>.
    - g. Compressor Full-Load Amperes: <Insert value>.
    - h. Compressor Locked-Rotor Amperes: <Insert value>.
  3. Sound-Pressure Level: <Insert value> dBa.

## 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 ground-mounted, compressor-condenser components on polyethylene mounting base.
- D. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

### 3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
  - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

### 3.3 SEQUENCE OF OPERATION

- A. The control of split system air conditioners shall be integrated into the existing Johnson Metasys BAS (hereinafter referred to as BAS).
- B. Upon call for cooling, indoor temperature reaches the high setpoint of 75 deg. F, the BAS shall energize the C1 and IU-1.
  - 1. Upon lowering the indoor temperature to the setpoint, the BAS shall de-energize the system after a programmable time delay is reached.
    - a. Time delay period to be determined by the Client Agency.
  - 2. If the temperature setpoint of 75 deg. F cannot be maintained, the BAS shall energize C1 and IU-2.
  - 3. Upon the next call for cooling, the BAS shall energize C1 and IU-2 as the lead.
  - 4. The BAS shall alternate between C2/IU-1 and C1/IU-2 as the lead/lag.
- C. Upon call for heating, indoor temp reaches the low setpoint of 50 deg. F, the BAS shall energize C1 and IU-1.
  - 1. Upon lowering the indoor temperature to the setpoint, the BAS shall de-energize the system after a programmable time delay is reached.
    - a. Time delay period to be determined by the Client Agency.
  - 2. If the temperature setpoint of 65 deg F cannot be maintained, the BAS shall energize C2 and IU-2.
  - 3. Upon the next call for heating, the BAS shall energize C-1 and IU-2 as the lead.
  - 4. The BAS shall alternate between C1/IU-1 and C1/IU-2 as the lead/lag.

3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
  - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

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

END OF SECTION 238126