

## **SECTION 238123 COMPUTER-ROOM AIR-CONDITIONERS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. Section includes computer-room air conditioners and accessories as follows:
  - 1. Vertical, precision computer room air-conditioning units and appurtenances with remote air-cooled condensers.

#### **1.3 DEFINITIONS**

- A. COP: Coefficient of performance.
- B. EER: Energy efficiency ratio.
- C. SCR: Silicon-controlled rectifier.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include material descriptions, dimensions of individual components and profiles, and finishes for computer-room air-conditioning units.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. LEED Submittals:
  - 1. Product Data for Credit EA 4: Documentation indicating that equipment and refrigerants comply.
  - 2. Product Data for Prerequisite IEQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
- C. Shop Drawings: For computer-room air conditioners.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

3. Include diagrams for power, signal, and control wiring.
- D. Color Samples: For unit cabinet, discharge grille, and exterior louver and for each color and texture specified.

#### **1.5 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Plans, elevations, and other details, drawn to scale, using input from installers of the items involved.
- B. Seismic Qualification Certificates: For computer-room air conditioners, accessories, and components, from manufacturer.
  1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.
- D. Sample Warranty: For special warranty.

#### **1.6 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For computer-room air conditioners to include in emergency, operation, and maintenance manuals.

#### **1.7 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Filters: One set(s) of filters for each unit.

#### **1.8 QUALITY ASSURANCE**

- A. Equipment shall be CSA-certified to the harmonized U.S. and Canadian product safety standard, "CSA C22.2 No 236/UL 1995 for Heating and Cooling Equipment" and are marked with the CSA c-us logo.
- B. The system shall be AHRI Certified<sup>TM</sup>, the trusted mark of performance assurance for heating, ventilation, air conditioning and commercial refrigeration equipment, using AHRI Standard 1360.

**1.9 WARRANTY**

- A. Special Warranty: Manufacturer agrees to repair or replace components of computer-room air conditioners that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period for Equipment: Manufacturer's standard, but not less than one year from date of Substantial Completion; Parts and Labor.
  - 2. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion; Parts Only.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Subject to compliance with the contracts, Contractor shall supply the following:
  - 1. Liebert; VS / MCM Series and PDX / MCM Series.
  - 2. DataAire.
  - 3. Stulz.
  - 4. Or approved equal.

**2.2 PERFORMANCE REQUIREMENTS**

- A. Seismic Performance: Computer-room air-conditioners, ceiling-mounted units shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified."
- B. 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.
- C. 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 - "Ventilation Rate Procedures," and Section 7 - "Construction and Startup."
- D. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1.
- E. ASME Compliance: Fabricate and label water-cooled condenser shell to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.

- 2.3 INDOOR, VERTICAL COMPUTER ROOM AIR-CONDITIONING UNITS  
(LESS THAN 7 COOLING TONS)
- A. Description: Self-contained, factory assembled, prewired, and prepiped; consisting of cabinet, fan, filters, and controls for floor-mounting with discharge plenum and grilles. Unit shall be top discharge and front return.
  - B. Cabinet: 20-gauge steel, powder coated with ½-inch, 1-1/2 lb density insulated panels. Panels shall be accessible via quarter turn fasteners.
  - C. Upflow Unit Plenum: Two-way, air discharge grilles. Plenum shall be constructed of 20-gauge steel with 1-inch thick, 1-1/2 lb density insulation and shall be powder coated to match the unit color. Plenum height shall be a minimum of 18-inches.
  - D. DX Cooling Coil: Copper tubes with hydrophilic coated aluminum fins.
  - E. Electric Reheat: Low Watt Density, 304 Stainless Steel, Tubular Construction protected by thermal safety switches and controlled in one stage.
  - F. Refrigeration System: Single refrigeration circuit included liquid line filter drier, a refrigerant sight glass, adjustable externally equalized expansion valve and a liquid line solenoid valve.
  - G. Compressor: R-410, digital scroll-type, variable capacity 20-100%.
    - 1. Options are as follows:
      - a. Suction gas cooled motor, vibration isolators, internal thermal overloads, manual reset high pressure switch.
      - b. RotoLock service valves, low pressure and high pressure transducer, crankcase heater and internal centrifugal oil pump.
      - c. Compressor sound jacket; 3/8-inch close cell polymeric jacket.
  - H. Drain Pans: Stainless steel drain pans with integral condensate pump powered through the unit power.
    - 1. Dual-Float Condensate Pump: 6 GPM at 30 FT HD, integral primary and secondary float switches, pump, motor assembly and reservoir. Secondary float is for high level alarm.
  - I. Fan: EC plug-type fans, variable speed controlled by the on-board controller. Impeller shall be made of aluminum and dynamically balanced. Fan shall be in the draw-thru configuration.
  - J. Filter: Deep pleated, 2-inch MERV 8 filters with filter clog alarm.
  - K. Humidifier: Steam Generating, Canister Style. Complete with disposable cylinder, supply and drain valves, steam distributor and electronic controls. Controlled via On-Board Control System.
  - L. On-Board Control System:
    - 1. User Interface: 9-inch LCD Color Touch Screen.
    - 2. Three-level password protection.

3. Communication Card for BACnet and Modbus.
  4. Remote Shutdown Terminal.
  5. Common Alarm Contact.
  6. Supply Air Temperature Sensor.
  7. Internal Temperature/Humidity Sensors for return air sensing.
  8. Smoke Sensor with visual and audible alarm and dry contact for monitoring by fire alarm system.
  9. Water Sensor: Solid State Water Sensor, hermetically sealed with alarm contacts.
  10. Filter alarm.
  11. Zone leak detection sensor with cable.
- M. Electrical: Single Point Power Connection with lockable, disconnect switch.
- N. Short-Circuit Current Rating: 65 kA SCCR.
- 2.4 INDOOR, VERTICAL COMPUTER ROOM AIR-CONDITIONING UNITS  
(GREATER THAN 7 COOLING TONS)
- A. Description: Self-contained, factory assembled, prewired, and prepiped; consisting of cabinet, fan, filters, and controls for floor-mounting with discharge plenum and grilles. Unit shall be top discharge and front return.
- B. Cabinet: 20-gauge steel, powder coated with 1-inch, 1-1/2 lb density insulated panels. Panels shall be accessible via quarter turn fasteners.
- C. Upflow Unit Plenum: Two-way, air discharge grilles. Plenum shall be constructed of 20-gauge steel with 1-inch thick, 1-1/2 lb density insulation and shall be powder coated to match the unit color. Plenum height shall be a minimum of 24-inches.
- D. DX Cooling Coil: Copper tubes with hydrophilic coated aluminum fins.
- E. Electric Reheat: 3-Stage, Low Watt Density, 304 Stainless Steel, Tubular Construction protected by thermal safety switches.
- F. Refrigeration System: Single refrigeration circuit included liquid line filter drier, a refrigerant sight glass, adjustable externally equalized expansion valve and a liquid line solenoid valve.
- G. Compressor: R-407C, digital scroll-type, variable capacity 20-100%.
1. Options are as follows:
- a. Suction gas cooled motor, vibration isolators, internal thermal overloads, manual reset high pressure switch.
  - b. RotoLock service valves, low pressure and high pressure transducer, crankcase heater and internal centrifugal oil pump.
  - c. Compressor sound jacket; 3/8-inch close cell polymeric jacket.
- H. Drain Pans: Stainless steel drain pans with integral condensate pump powered through the unit power.

1. Dual-Float Condensate Pump: 6 GPM at 30 FT HD, integral primary and secondary float switches, pump, motor assembly and reservoir. Secondary float is for high level alarm.
- I. Fan: EC plug-type fans, variable speed controlled by the on-board controller. Impeller shall be made of aluminum and dynamically balanced. Fan shall be in the draw-thru configuration.
- J. Filter: Deep pleated, 4-inch MERV 8 filters with filter clog alarm.
- K. Humidifier: Steam Generating, Canister Style. Complete with disposable cylinder, supply and drain valves, steam distributor and electronic controls. Controlled via On-Board Control System.
- L. On-Board Control System:
  1. User Interface: 9-inch LCD Color Touch Screen.
  2. Three-level password protection.
  3. Communication Card for BACnet and Modbus.
  4. Remote Shutdown Terminal.
  5. Common Alarm Contact.
  6. Supply Air Temperature Sensor.
  7. Internal Temperature/Humidity Sensors for return air sensing.
  8. Smoke Sensor with visual and audible alarm and dry contact for monitoring by fire alarm system.
  9. Water Sensor: Solid State Water Sensor, hermetically sealed with alarm contacts.
  10. Filter alarm.
- M. Electrical: Single Point Power Connection with lockable, disconnect switch.
- N. Short-Circuit Current Rating: 65 kA SCCR.

## **2.5 REMOTE, AIR-COOLED DIRECT EXPANSION CONDENSERS**

- A. Description: Remote, Air-Cooled, Direct Expansion Condensing Unit with the following:
  1. Corrosion-resistant cabinet.
  2. Micro-channel, Aluminum tubes, fins, and manifolds.
  3. Variable Speed, EC fan with fan guards.
  4. Electrical controls.
  5. Mounting legs.
- B. Cabinet: The condenser cabinet shall be constructed of bright aluminum sheet and divided into individual fan sections by full width baffles. Internal structural support members, including coil support frame, shall be galvanized steel for strength and corrosion resistance. Panel doors shall be provided on two sides of each coil/fan section to permit coil cleaning. An electrical panel shall be contained inside a factory mounted, NEMA 3R weatherproof electrical enclosure.
  1. Aluminum legs shall be provided to mount unit for vertical air discharge with rigging holes for hoisting the unit into position. Standard height is 18-inch.

- C. Condenser Coil: Microchannel Coils, Aluminum microchannel tubes, fins, and manifolds. Full-depth, louvered aluminum fins shall fill spaces between the tubes. Tubes, fins, and aluminum headers shall be oven brazed to form a complete refrigerant-to-air heat exchanger coil. Copper stub pipes shall be electric resistance welded to aluminum coils and joints protected with polyolefin to seal joints from corrosive environmental elements. Coil assemblies shall be factory leak-tested at a minimum of 300 psig. Hot gas and liquid lines shall be copper and shall be brazed using nitrogen gas flow to the stub pipes with spun-closed ends for customer piping connections. Complete coil/piping assembly shall be then filled and sealed with an inert gas holding charge for shipment.
- D. Fan Motor / Blade Assembly: Factory Balanced, External Rotor Motor, Cast-Aluminum Fan Blades.
- E. Fan Guards: Heavy gauge, close meshed steel wire, Black corrosion resistant finish.
- F. Electrical: Single Point Power Connection with lockage, fused disconnect switch rated for outdoors.

## 2.6 CAPACITIES AND CHARACTERISTICS

- A. Refer to the contract drawings for scheduled capacities and characteristics.

## PART 3 - EXECUTION

### 3.1 CONSTRUCTION WASTE MANAGEMENT (LEED)

- A. The contractor, subcontractors, and their personnel shall follow the procedures and practices for waste separation, collection and transport as defined in the contractor's "Waste Management Plan" as required by Division 01 Section "Construction Waste Management."

### 3.2 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for hydronic and refrigeration piping systems to verify actual locations of piping connections before equipment installation.
- C. Examine walls, floors, and roofs for suitable conditions where computer-room air conditioners will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.3 INSTALLATION

- A. Installation shall follow manufacturer's written instructions without exception.

- B. Layout and install computer-room air conditioners and suspension system coordinated with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.
- C. Install computer-room air conditioners level and plumb, maintaining manufacturer's recommended clearances.
- D. Air-Cooled Refrigerant Condenser Mounting: Install using restrained spring isolators within equipment supports positively attached to roof structure. Comply with requirements for vibration isolation devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

### **3.4 CONNECTIONS**

- A. Piping installation requirements are specified in other heating, ventilating, and air-conditioning Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to computer-room air conditioners, allow space for service and maintenance.
- C. Water and Drainage Connections: Comply with applicable requirements in Section 232113 "Hydronic Piping." Provide adequate connections for condensate drain, and humidifier flushing system.
- D. Refrigerant Piping: Comply with applicable requirements in Section 232300 "Refrigerant Piping." Provide shutoff valves and piping.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Inspect for and remove shipping bolts, blocks, and tie-down straps.
  - 2. After installing computer-room air conditioners and after electrical circuitry has been energized, test for compliance with requirements.
  - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Computer-room air conditioners will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. After startup service and performance test, change filters and flush humidifier.



**3.6 ADJUSTING**

- A. Adjust initial temperature and humidity set points.
- B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

**3.7 DEMONSTRATION**

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

**END OF SECTION 238123**