

SECTION 23 81 23 – 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. This Section includes the following types of computer-room air-conditioning units:

- 1. Floor-mounting units 6 tons (21 kW) and larger.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For computer-room air-conditioning units to include in emergency, operation, and maintenance manuals.
- E. Warranties: Special warranties specified in this Section.
- F. LEED Submittals:
 - 1. Credit EA 4: Manufacturers' product data for refrigerants, including printed statement that refrigerants are free of HCFCs.

1.4 QUALITY ASSURANCE

- A. 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.
- B. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

- C. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE/IESNA 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- D. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE/IESNA 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- E. ASME Compliance: Fabricate and label water-cooled condenser shell to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 01.
- F. Units shall be designed to operate with HCFC-free refrigerants.

1.5 COORDINATION

- A. Coordinate layout and installation of computer-room air-conditioning units and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.
- B. Coordinate installation of computer-room air-conditioning units with computer-room access flooring Installer.
- C. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of computer-room air-conditioning units that fail in materials or workmanship within specified warranty period.
- B. Warranty Period for Compressors: Manufacturer's standard, but not less than **five** years from date of Substantial Completion.
- C. Warranty Period for Control Boards: Manufacturer's standard, but not less than **three years** from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 FLOOR-MOUNTING UNITS 6 TONS (21 kW) AND LARGER

A. **Available** Manufacturers:

1. Carrier Corp.
2. Compu-Aire, Inc.
3. Data Aire Inc.
4. IPAC, Inc.
5. Koldwave/Mestek.
6. Liebert Corporation.
7. McQuay International.
8. Pomona Air.
9. Stulz Investment Corp. of America.
10. Trane Company (The); North American Commercial Group.

B. Description and Assembly: Packaged, factory assembled, prewired, and prepiped; consisting of cabinet, fans, filters, humidifier, and controls.

1. Assembly: Upflow air delivery, in **draw**-through configuration.

C. Cabinet and Frame: Welded steel, suitably braced for rigidity, supporting compressors and other mechanical equipment and fittings; with floor stand with adjustable legs and vibration isolation pads.

1. Doors and Access Panels: Galvanized steel with polyurethane gaskets, hinges, and concealed fastening devices.
2. Insulation: Thermally and acoustically insulate cabinet interior with 1-inch- (25-mm-) thick duct liner.
3. Finish of Exterior Surfaces: Baked-on, textured vinyl enamel, color **to match computer equipment**.
4. Floor Stand: Welded tubular steel.

D. Evaporator Fan: Double inlet, forward curved, centrifugal, and statically and dynamically balanced.

1. Drive: **Direct**.
2. Motor: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."

- a. Noise Rating: Quiet.

E. Compressors: **Hermetic scroll**; with **oil strainer, internal motor overload protection**, resilient suspension system, crankcase heater, manual-reset high-pressure switch, and pump-down low-pressure switch.

1. Refrigeration Circuits: Two, each with hot-gas mufflers, thermal-expansion valve with external equalizer, liquid-line solenoid valve, liquid-line filter-dryer, sight glass with moisture indicator, service shutoff valves, charging valves, accumulator sized for liquid seal under light load, and charge of refrigerant.
2. Refrigerant: **R-410A**.

- F. Evaporator Coil: Alternate-row or split-face-circuit, direct-expansion coil of seamless copper tubes expanded into aluminum fins. Mount coil assembly over stainless-steel drain pan **having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir.**
- G. Air-Cooled Condenser: Corrosion-resistant cabinet, copper-tube aluminum-fin coils arranged for two circuits, multiple direct-drive propeller fans with permanently lubricated ball bearings, and single-phase motors with internal overload protection, integral electric control panel, and disconnect switch. Control capacity by cycling fans.
- H. Chilled-Water Coil: Seamless copper tubes expanded into aluminum fins with modulating control valve. Mount coil assembly over stainless-steel drain pan **having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir.**
- I. Electric-Resistance Heating Coil: Enclosed finned-tube electric elements arranged for minimum of three stages, with primary and secondary thermal switches, manual-reset overload protection, and branch-circuit overcurrent protection.
- J. Filter: Pleated, lofted, nonwoven, reinforced cotton fabric; supported and bonded to welded-wire grid; enclosed in cardboard frame **with 2-inch- (50-mm-) thick, disposable, glass-fiber prefilter.**
1. Nominal Thickness: **2 inches (50 mm).**
 2. Dust-Spot Efficiency: **30 percent.**
 3. Weight Arrestance: 90 to 92 percent.
 4. Initial Resistance at 500-FPM (2.54-m/s) Face Velocity: 0.30-inch wg (75 Pa).
 5. Recommended Final Resistance: 1-inch wg (250 Pa).
- K. No Humidifier will be integrated to the unit.
- L. Electronic-Control System: Solid state, with start button, stop button, temporary loss of power indicator, manual-reset circuit breakers, temperature control, humidity control, and monitor panel.
1. Monitor Panel: Backlighted, with no visible indicator lights until operating function is activated; indicators include cooling, humidification, loss of airflow, change filters, high temperature, low temperature, high humidity, low humidity, high head pressure (each compressor), and low suction pressure (each compressor).
 2. Temperature- and Humidity-Control Modules: Solid state, plug-in; with adjustable set point, push-to-test calibration check button, and built-in visual indicators to show mode of operation.
 3. Location: Behind hinged door in front of unit; isolated from conditioned airstream to allow service while system is operating.
- M. Microprocessor-Control System: Continuously monitors operation of process cooling system; continuously displays room temperature and room relative humidity; sounds alarm on system malfunction and simultaneously displays problem. If more than one malfunction occurs, system displays fault in sequence with room temperature and continues to display fault when malfunction is cleared until system is reset.
1. Malfunctions:

- a. Power Loss.
 - b. Loss of Airflow.
 - c. Clogged Air Filter.
 - d. High Room Temperature.
 - e. Low Room Temperature.
 - f. High Humidity.
 - g. Low Humidity.
 - h. Smoke/Fire.
 - i. Water-under-Floor.
 - j. Supply Fan Overload.
 - k. Compressor No. 1--Overload.
 - l. Compressor No. 1--Low Pressure.
 - m. Compressor No. 1--High Pressure.
 - n. Compressor No. 2--Overload.
 - o. Compressor No. 2--Low Pressure.
 - p. Compressor No. 2--High Pressure.
2. LED Display:
- a. Control Power On.
 - b. Humidifying.
 - c. Dehumidifying.
 - d. Compressor No. 1 Operating.
 - e. Compressor No. 2 Operating.
 - f. Heat Operating.
 - g. Economy Cooling.
3. Push buttons shall stop and start process cooling system, silence audible alarm, test LED indicators, and display room relative humidity.
4. Remote Signaling: Provide terminals for remote signaling of system status and alarms.
5. Additional Monitoring:
- a. Monitor constant and variable motor loads.
 - b. Monitor variable frequency drive operation.
 - c. Monitor cooling load.
 - d. Monitor economizer cycles.
 - e. Monitor air distribution static pressure and ventilation air volumes.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install computer-room air-conditioning units level and plumb, maintaining manufacturer's recommended clearances. **Install according to ARI Guideline B.**
- B. Curb Support: Install and secure roof-mounting units on curbs and coordinate roof penetrations and flashing with roof construction. **Secure units to curb support with anchor bolts.**
- C. Install suspended components level. Coordinate wall penetrations and flashing with wall construction. **Secure units to structural support with anchor bolts.**

- D. Install air-cooled condenser on rubber-in-shear vibration isolators.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Water and Drainage Connections: Comply with applicable requirements in Division 23 Section "Domestic Water Piping." Provide adequate connections for water-cooled units, condensate drain, and humidifier flushing system.
- D. Refrigerant Piping: Comply with applicable requirements in Division 23 Section "Refrigerant Piping." Provide shutoff valves and piping.
- E. Electrical System Connections: Comply with applicable requirements in Division 26 Sections for power wiring, switches, and motor controls.
- F. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, **test, and adjust** field-assembled components and equipment installation, including connections, **and to assist in field testing**. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 - 2. After installing computer-room air-conditioning units 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.

3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
- B. Verify that computer-room air-conditioning units are installed and connected according to manufacturer's written instructions and the Contract Documents.

- C. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 26 Sections.
- D. Complete installation and startup checks according to manufacturer's written instructions.
- E. After startup service and performance test, change filters and flush humidifier.

3.5 ADJUSTING

- A. Adjust initial temperature 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 site outside normal occupancy hours for this purpose, without additional cost.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain computer-room air-conditioning units. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION