Facility Design Guidelines: Workplace, Architecture & Engineering

Computer Room Air Conditioners
MasterFormat Section 23-81-23

The guidelines described herein shall be used on all projects, unless USAA’s Project Variance Request process has been used to secure an approved, project-specific variance.

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<td>10/31/2017</td>
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<tr>
<td>01</td>
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<td>Revised fan motor requirement to reflect ECM motor requirement</td>
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<td>Revised format for upload to USAA.com</td>
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1.1 GENERAL
A. Design shall comply with NFPA, ASHRAE 90.1, ASHRAE 55, ASHRAE 62.1, IBC, IMC, IPC, IFC, NEC, IECC and any other authority having jurisdiction.

B. Environmental Control
1. The temperature inside telecommunications rooms must be maintained between 64 °F to 73 °F and relative humidity between 40%-55%.
2. There must be at least one air exchange per hour in the rooms to maintain positive pressure inside the rooms.
3. Continuous environmental control (24 hours per day, 365 days per year).
4. Maintain positive pressure with a minimum of one air change per hour.
5. HVAC supplying the room should be on emergency power.

C. Computer room air conditioners are to be packaged-type, freestanding units complete with internal wiring, piping, and controls.

D. Accessories Provided by Manufacturer:
1. Floor stand/Unit stand.
2. Water Detectors.

E. Alarms must annunciate locally and remotely to Building Automation System:
1. Loss of power
2. Loss of airflow
3. High room temperature
4. Low room temperature
5. Smoke/Fire
6. Water under floor
7. EC Fan fault

F. Building Automation System (BAS) Interface:
1. Provide factory-installed network integration with existing BAS.
2. Open-protocol communication interface shall enable the BAS operator to remotely control and monitor the unit remotely from an operator workstation.
3. Provide an update to the operator interface software to the latest version of the software being used.
4. Each building level control panel shall continuously perform self diagnostics on all hardware modules and network communications.
5. The system level control panel shall provide both local and remote annunciation of any detected component failures, low battery conditions or repeated failure to establish communication with any system.
6. Provide 10% more input and output points capacity than required for new equipment shown on drawings.
7. Provide a router for each subnetwork to connect the floor level network to the base building backbone level network. The router shall connect FLN subnetworks to TCP/IP over Ethernet.

G. Warranty
1. Standard Contractors one year parts and labor from date of Substantial Completion.
2. Compressor: Ten years from date of Substantial Completion
3. Control Boards: Five years from date of Substantial Completion

H. Permits, Fees and Compliance
1. All permits for this work are the responsibility of the contractor and coordination of all inspections or re-inspections shall be covered by the contractor.
2. The contractor will pay all permits and construction/inspection fees associated with this project.
3. The Contractor shall comply in every respect with all requirements of NFPA, local Fire Department regulations, local municipality and/or utility company requirements, ANSI, ASME, ARI, SMACNA, ASTM, NEMA, OSHA and any other authorities having jurisdiction. In no case does this relieve the Contractor of the responsibility of complying with these specifications and drawings where specified conditions are of higher quality than the requirements of the above-specified authorities.
4. Conformance with Agency Requirements: Where materials or equipment are specified to be approved, listed, tested, or labeled by the Underwriters Laboratories, Inc., or constructed and/or tested in accordance with the standards of the American Society of Mechanical Engineers or the Air Moving and Conditioning Association, the Contractor shall submit proof that the items furnished under this section of the specifications conform to such requirements. The label of the Underwriters Laboratories, Inc., applied to the item will be acceptable as sufficient evidence that the items conform to such requirements. The ASME stamp or the AMCA label will be acceptable as sufficient evidence that the items conform to the respective requirements.

I. Supervision
1. Each Contractor and subcontractor shall keep a competent superintendent or foreman on the job at all times.

1.2 FLOOR-MOUNTED UNITS 6 TONS AND LARGER
A. Manufacturers:
1. Liebert Corporation
2. Compu-Aire
3. Data Aire
B. Description: Packaged, factory assembled, prewired, and prepiped; consisting of cabinet, fans, filters, unit stand and controls.
1. Cabinet and Frame: Welded steel, braced for rigidity, and supporting compressors and other mechanical equipment and fittings.
3. Insulation: Thermally and acoustically insulated cabinet interior with 1-inch thick duct liner.
4. Finish of Exterior Surfaces: Baked-on, textured vinyl enamel; color as selected from manufacturer’s standard colors.

C. Supply-Air Fan(s):
1. Fan shall be statically and dynamically balanced to minimize vibration in operation.
2. Motor shall be ECM
3. Fan type shall be plug/plenum type.
4. Drive type: Direct

D. Refrigeration System:
1. Compressors: Variable speed hermetic scroll compressor with suction gas cooled motor with operating speed of 3500 rpm; thermal overloads; suction line strainer; with oil strainer, internal motor overload protection, automatic reset high pressure switch, and pump down low pressure switch.
2. Refrigeration Circuits: Circuit will contain thermal expansion valve with external equalizer, liquid line solenoid valve, liquid line filter dryer, sight glass with moisture indicator, service shutoff valves, charging valves, and charge of refrigerant.
3. Refrigerant: R-407C or R-410A.
4. Refrigerant Evaporator Coil: Refrigerant evaporator coil shall have capacity, number of rows, face velocity, and dimensions as scheduled. Coil shall be constructed with copper tubes and aluminum fins.
   a. Mount coil assembly over stainless steel drain pan and provide a condensate pump unit with integral float switch, pump/motor assembly, and condensate reservoir.
5. Remote Air-Cooled Refrigerant 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 and integral electric control panel and disconnect switch.
6. Split system shall have suction and liquid line compatible fittings and refrigerant piping for field interconnection.

E. Electric Resistance Heating Coil: Finned tube electric elements with contactor and high temperature limit switches.

F. Filter: 2-inch thick, disposable, glass fiber media MERV 14.

G. Integral Electrical Controls: Unit mounted electrical enclosure with piano-hinged door, grounding lug, combination magnetic starters with overload relays, circuit breakers, cover interlock, and fusible control circuit transformer.

H. Disconnect Switch: Nonautomatic, molded case circuit breaker with handle accessible when panel is closed and capable of preventing access until switched to off position.

I. Control System: Unit mounted panel with main fan contactor, compressor contactor, compressor start capacitor, control transformer with circuit breaker, solid state temperature...
and humidity control modules, humidity contactor, time delay relay, heating contactor, and high temperature thermostat. Provide solid state, wall mounted control panel with start stop switch, adjustable humidity set point, and adjustable temperature set point.

1.3 FLOOR-MOUNTED UNITS 5 TONS AND SMALLER
A. Manufacturers:
   1. Liebert Corporation
   2. Compu-Aire
   3. Data Aire
B. Description: Self-contained, factory assembled, prewired, and pre-piped; consisting of cabinet, fan, filters, unit stand and controls; for vertical floor mounting with ducted or plenum distribution.
C. Cabinet and Frame: Welded tubular steel frame with removable steel panels with baked enamel finish, insulated with 1-inch thick duct liner.
D. Supply Air Fan(s):
   1. Fan shall be statically and dynamically balanced to minimize vibration in operation.
   2. Motor shall be ECM
   3. Fan type shall be plug/plenum type.
   4. Drive type: Direct
E. Refrigeration System:
   1. Compressors: Variable capacity hermetic scroll compressor; with suction gas cooled motor with operating speed of 3500 rpm; vibration isolators, thermal overloads; oil sight glass; suction line strainer; and reversible oil pumps; with oil strainer, internal motor overload protection, resilient suspension system, crankcase heater, manual reset high pressure switch, and pump down low pressure switch.
   2. Refrigeration Circuits: Circuit will contain thermal expansion valve with external equalizer, liquid line solenoid valve, liquid line filter dryer, sight glass with moisture indicator, service shutoff valves, charging valves, and charge of refrigerant.
   3. Refrigerant: R-407C or R-410A.
   4. Refrigerant Evaporator Coil: Refrigerant evaporator coil shall have capacity, number of rows, face velocity, and dimensions as scheduled. Coil shall be constructed with copper tubes and aluminum fins.
      a. Mount coil assembly over stainless steel drain pan and provide a condensate pump unit with integral float switch, pump/motor assembly, and condensate reservoir.
   5. Remote Air Cooled Refrigerant Condenser: Integral, copper tube aluminum fin coil with centrifugal fan, belt driven.
   6. Split system shall have suction and liquid line compatible fittings and refrigerant piping for field interconnection.
F. Electric Resistance Heating Coil: Finned tube electric elements with contactor and high temperature limit switches.
G. Filter: 2 inch thick, disposable, glass fiber media MERV 14.
H. Disconnect Switch: Nonautomatic, molded-case circuit breaker with handle accessible when panel is closed and capable of preventing access until switched to off position.
I. Control System: Unit mounted panel with main fan contactor, compressor contactor, compressor start capacitor, control transformer with circuit breaker, solid-state temperature and humidity control modules, humidity contactor, time delay relay, heating contactor, and high temperature thermostat. Provide solid state, wall mounted control panel with start-stop switch, adjustable humidity set point, and adjustable temperature set point.

1.4 INSTALLATION
A. Install computer-room air conditioners level and plumb, maintaining manufacturer’s recommended clearances.

1.5 CONNECTIONS
A. Piping installation requirements should be specified in other Division 23 Sections. Drawings should also indicate general arrangement of piping, fittings, and specialties.
B. Install piping adjacent to machine to allow service and maintenance.
C. Water and Drainage Connections: Provide adequate connections for water-cooled units, condensate drain.
D. Refrigerant Piping: Provide shutoff valves and piping.

1.6 FIELD QUALITY CONTROL
A. Tests and Inspections:
   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.
   5. Test that unit can be remotely controlled and monitored from BAS operator remote workstation.
B. Computer room air conditioners will be considered defective if they do not pass tests and inspections.
C. Prepare test and inspection reports.
D. Set up trends that are listed on commissioning guidelines.
E. After startup service and performance test, change filters and flush humidifier (if required).

1.7 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.

END OF SECTION