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## GUIDE SPECIFICATION

### SECTION 23 81 23.13: COMPUTER-ROOM AIR-CONDITIONERS, CEILING MOUNTED UNITS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section includes HK™ horizontal series ceiling mounted, packaged and split computer-room air conditioning units with the following components and accessories:
  - 1. Cabinet
  - 2. Direct Expansion DX System
  - 3. Coils
  - 4. Electric Heat
  - 5. Humidifier
  - 6. Fans
  - 7. Controls
  - 8. Accessories

##### 1.2 RELATED SECTIONS

- A. Division 01 Specification Sections
- B. Section 23 05 00 – Common Work Results for HVAC.
- C. Section 26 05 00 – Common Work Results for Electrical.

##### 1.3 SUBMITTALS

- A. Submit documentation as required under Division 01.
- B. Product Data: Manufacturer's technical data for each product to be used, including rated capacities, dimensions, furnished specialties, and accessories.
- C. Shop Drawings: Include details of equipment assemblies, including dimensions, weights, required clearances, components, and locations of field connections.
- D. Maintenance and operation information and instructions.
  - 1. Latest IOM information always available at [www.aboveairioms.com](http://www.aboveairioms.com).

##### 1.4 QUALITY ASSURANCE

- A. Comply with requirements of authorities having jurisdiction and all applicable codes at the location of the project.
- B. Manufacturer Qualifications: Minimum 5 years' experience manufacturing similar products.
- C. Installer Qualifications: Minimum 2 years' experience manufacturing similar products.

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## 1.5 RECEIVING AND STORAGE

- A. Inspect product immediately upon delivery, note and report any damage or missing components.
- B. Handle the product in a manner to avoid damage at all times.

## 1.6 WARRANTY

- A. Provide manufacturer's standard limited warranty: 1 year.
  - 1. Compressors: 5 years.

## PART 2 - PRODUCTS

### 2.1 SYSTEM DESCRIPTION

- A. HK™ Horizontal series ceiling mounted computer-room air conditioning units. Systems are configured for ceiling mounted applications.

### 2.2 MANUFACTURERS

- A. Manufacturers:
  - 1. AboveAir Technologies, located at 5179 Mountville Road, Frederick, MD 21703; Tel (301) 874-1130; [www.abovair.com](http://www.abovair.com); sales@abovair.com
- B. Substitutions: Not permitted.

### 2.3 **[AIR-COOLED] [WATER-COOLED], [PACKAGED] [SPLIT], CEILING MOUNTED HK™ HORIZONTAL AIR CONDITIONING UNIT.**

- A. Design Capacities:
  - 1. Supply Air Fan
    - a. Airflow: **<Insert Value>** CFM.
    - b. Static Pressure: **<Insert Value>** inches w.g.
    - c. Motor Horsepower: **<Insert Value>**.
  - 2. Refrigerant Coil
    - a. Total Cooling Capacity: **<Insert Value>** Btu/h.
    - b. Sensible Cooling Capacity: **<Insert Value>** Btu/h.
    - c. Entering Air Dry Bulb Temperature: **<Insert Value>** deg F.
    - d. Entering Air Wet Bulb Temperature: **<Insert Value>** deg F.
  - 3. Hot Gas Reheat Coil

- a. Heating Capacity: **<Insert Value>** Btu/h.
- 4. Chilled Water Coil
  - a. Total Cooling Capacity: **<Insert Value>** Btu/h.
  - b. Sensible Cooling Capacity: **<Insert Value>** Btu/h.
  - c. Entering Air Dry Bulb Temperature: **<Insert Value>** deg F.
  - d. Entering Air Wet Bulb Temperature: **<Insert Value>** deg F.
  - e. Entering Water Temperature: **<Insert Value>** deg F.
  - f. Leaving Water Temperature: **<Insert Value>** deg F.
  - g. Water Flow: **<Insert Value>** GPM.
  - h. Water Pressure Drop: **<Insert Value>** ft w.g.
- 5. Electric Heat
  - a. Capacity: **<Insert Value>** kW.
- 6. Hot Water Coil
  - a. Capacity: **<Insert Value>** Btu/h.
  - b. Water Flow: **<Insert Value>** GPM.
  - c. Water Pressure Drop: **<Insert Value>** ft w.g.
  - d. **[Ethylene] [Propylene]** Glycol: **<Insert Value>**% by volume.
- 7. Steam Coil
  - a. Capacity: **<Insert Value>** Btu/h.
- 8. Condenser Fan
  - a. Airflow: **<Insert Value>** CFM.
  - b. Static Pressure: **<Insert Value>** inches w.g.
  - c. Number of Fans: **<Insert Value>**.
  - d. Motor Horsepower: **<Insert Value>**.
- 9. Condenser Coil (Air-Cooled)
  - a. Ambient Air Temperature: **<Insert Value>** deg F.
- 10. Condenser Coil (Water-Cooled)
  - a. Entering Water Temperature: **<Insert Value>** deg F.
  - b. Leaving Water Temperature: **<Insert Value>** deg F.
  - c. **[Ethylene] [Propylene]** Glycol: **<Insert Value>**% by volume.
  - d. Water Flow: **<Insert Value>** GPM.

- e. Water Pressure Drop: **<Insert Value>** ft w.g.
- f. Design Pressure: **<Insert Value>** psig.

11. Humidifier

- a. Capacity: **<Insert Value>** lb/hr.

B. Performance requirements:

- 1. UL compliance: UL Standard 1995, ETL listed.
- 2. NFPA compliance: Compliance with NFPA 90A or 90B.

C. Cabinet

1. Evaporator compartment:

- a. Construction: Single-wall insulated panels, heavy gauge galvanized steel.
- b. Insulation and Adhesive.
  - 1) Material: High density 2 lb/f t<sup>2</sup> closed cell foam.
  - 2) Thickness: 1 inch.
  - 3) Adhesive: ASTM C 916, Type I compliant.
- c. Drain pan: Stainless steel, insulated.
- d. Air pattern: **[Ducted, Standard Same Face] [Ducted, Mirror-Image Same Face] [Ducted, Straight-thru (ZST)] [Ducted, Mirror-ImageStraight-thru (ZST)] [Ducted, Straight-thru Right-to-left (RLST)] [Ducted, Straight-thru Left-to-right (LRST)] [Ducted, 90°right-angle (left-side return/rear-side discharge)] [Ducted 90°right-angle (left-side return/front-side discharge)].**
- e. Filter: **[2" Merv-8] [4" Merv-8] [2" Merv-13] [4" Merv-13] [2" Merv-8 (Pre) 4" Merv-13 (Final)].**

2. Condensing compartment (Packaged, Split Air-Cooled Ducted, Split Water-Cooled):

- a. Construction: Single-wall, heavy gauge galvanized steel.
- b. Insulation.
  - 1) Material: **[None] [High density 2 lb/f t<sup>2</sup> closed cell foam].**
  - 2) Thickness: **[None] [1 inch].**
  - 3) Adhesive: **[None] [ASTM C 916, Type I compliant].**
- c. Air pattern: **[None] [Ducted, Standard Same Face] [Ducted, Mirror-Image Same Face] [Ducted, Straight-thru (ZST)] [Ducted, 90°right-angle (LD)].**

3. Condensing compartment (Split Air-Cooled):

- a. Construction: Single-wall, heavy gauge steel finished with baked enable finish.

D. Direct expansion cooling [**and dehumidifying**] system.

1. Direct-expansion type system.

- a. Compressor: [**Single**] [**Dual**] circuit [**fixed-speed**] [**2-speed**] [**lead digital**] scroll.
  - 1) Refrigerant: R-410A
  - 2) Overload protected
  - 3) Location: [**Installed with Evaporator, in Mechanical Compartment**]  
[**Installed in Condensing Compartment**].
- b. High refrigerant pressure safety switch.
- c. Low refrigerant pressure safety switch.
- d. Crankcase heater.
- e. Filter-drier.
- f. Sight-glass.
- g. Thermal expansion valves with external equalizer.
- h. Capacity control: [**None**] [**Hot gas bypass**].
- i. Low ambient control option: [**None**] [**-20°F Variable Speed Blower**] [**-30°F Flooded head pressure control valve**] [**45°F Low entering water temperature kit**].
- j. Additional options: [**None**] [**Receiver**] [**Suction line accumulator**] [**Sound jacket**].

E. Coils

1. Evaporator Coil:

- a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
- b. Rows: [**3**][**4**][**5**][**6**].
- c. Fins: 12 fpi.
- d. Coating: [**None**] [**Heresite**] [**Electrofin**] [**HYCOR 2-Coat Corrosion Resistant Hydrophilic Fin-Stock**].

2. Hot Gas Reheat Refrigerant Coil:

- a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
- b. Rows: 1.
- c. Fins: 12 fpi.
- d. Coating: [**None**] [**Heresite**] [**Electrofin**] [**HYCOR 2-Coat Corrosion Resistant Hydrophilic Fin-Stock**].

- e. Valve Type: **[On/Off]** **[Modulating]** 3-way.
3. Chilled Water Coil:
- a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
  - b. Rows: **[3]****[4]****[5]****[6]**.
  - c. Fins: 12 fpi.
  - d. Coating: **[None]** **[Heresite]** **[Electrofin]** **[HYCOR 2-Coat Corrosion Resistant Hydrophilic Fin-Stock]**.
  - e. Valve type: **[Factory-installed, 2-way]** **[Factory-installed, 3-way]**.
  - f. Valve pressure rating: **[300 psig]** **[580 psig]**.
  - g. Control: **[Single stage]** **[Modulating]**.
4. Condenser Coil (Air-Cooled, Ducted):
- a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
  - b. Coating: **[None]** **[Heresite]** **[Electrofin]** **[HYCOR 2-Coat Corrosion Resistant Hydrophilic Fin-Stock]**.
5. Condenser Coil (Air-Cooled, Free-Standing):
- a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
  - b. Coating: **[None]** **[Heresite]** **[Electrofin]** **[HYCOR 2-Coat Corrosion Resistant Hydrophilic Fin-Stock]**.
6. Condenser Coil (Water-Cooled):
- a. Construction: Water-cooled coaxial condenser.
  - b. Valve type: **[Factory-installed, 2-way]** **[Factory-installed, 3-way]**.
  - c. Valve pressure rating: **[150 psig]** **[300 psig]** **[580 psig]**.
  - d. Flow provide switch: **[None]** **[Paddle-type Flow Switch]** **[Wet-wet differential pressure switch (200 psig rated)]**.
7. Hot Water Heat:
- a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
  - b. Rows: **[1]****[2]**.
  - c. Coating: **[None]** **[Heresite]** **[Electrofin]** **[HYCOR 2-Coat Corrosion Resistant Hydrophilic Fin-Stock]**.
  - d. Valve type: **[Field-installed, 2-way]** **[Field-installed, 3-way]**.
  - e. Valve pressure rating: **[300 psig]** **[580 psig]**.

- f. Control: **[Single stage]** **[Modulating]**.
- 8. Steam Heat:
  - a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
  - b. Rows: 1
  - c. Coating: **[None]** **[Heresite]** **[Electrofin]** **[HYCOR 2-Coat Corrosion Resistant Hydrophilic Fin-Stock]**.
  - d. Valve type: **[Field-installed, 2-way]** **[Field-installed, 3-way]**.
  - e. Valve pressure rating: **[300 psig]** **[580 psig]**.
  - f. Control: **[Single stage]** **[Modulating]**.
- 9. Freecooling Coil:
  - a. Construction: Aluminum-plate fin and seamless copper tube in galvanized steel casing.
  - b. Rows: **[4]****[5]****[6]**.
  - c. Coating: **[None]** **[Heresite]** **[Electrofin]** **[HYCOR 2-Coat Corrosion Resistant Hydrophilic Fin-Stock]**.
  - d. Valve type: **[Field-installed, 2-way]** **[Field-installed, 3-way]**.
  - e. Valve pressure rating: **[300 psig]** **[580 psig]**.
  - f. Control: **[Single stage]** **[Modulating]**.
- F. Electric Heat
  - 1. Elements: Stainless steel, finned-tube type mounted in galvanized steel frame.
  - 2. Over Temperature Protection: Disk -type, automatic reset thermal cut-out.
  - 3. Control: **[Single stage]** **[SCR control]**.
- G. Humidifier
  - 1. Electrode steam canister type humidifier with disposable canister, steam distributor, and fill and drain valves.
  - 2. Control: Single stage with automatic flush cycle.
- H. Fans
  - 1. Supply fan:
    - a. Type: **[Double width, double inlet, forward curved blower]** **[Backward-inclined, high efficiency impeller]**.
    - b. Motor: **[Belt Drive]** **[Direct drive, EC]**.
    - c. Direct Drive: Motor mounted resiliently in the fan inlet.
  - 2. Condenser fan (Ducted Condenser):

- a. Type: [**Double width, double inlet, forward curved blower**] [**Backward-inclined, high efficiency impeller**].
  - b. Motor: [**Belt Drive**] [**Direct drive, EC**].
  - c. Direct Drive: Motor mounted resiliently in the fan inlet.
- 3. Condenser fan (Free-standing Condenser):
  - a. Type: Axial propeller.
  - b. Motor: [**Direct drive, split capacitor**] [**Direct drive, EC**].
- I. Motors
  - 1. Motor sizes: As indicated herein, or such that the motor will not be required to operate in service factor range about 1.0.
  - 2. Service Factor: 1.15.
  - 3. Motor Bearings: Maintenance free, permanently lubricated deep-groove bearings
  - 4. Efficiency: Premium.
- J. Controls
  - 1. Thermostat control.
    - a. Control type: 7-day programmable thermostat.
    - b. Controls 2 stages of cooling, 2 stages of heating.
    - c. Safeties:
      - 1) Circuit 1 [**& 2**] high pressure switch (auto-resetting).
      - 2) Circuit 1 [**& 2**] low pressure switch (auto-resetting).
  - 2. Microprocessor based PLC controller.
    - a. Control type: [**MC-2000 RT Temperature only control**] [**MC-2000 RH Temperature & Humidity control**] [**MC-2000 V Variable Air Volume control**].
    - b. Remote display terminal with push button navigation and [**50 ft**] [**100 ft**] [**150 ft**] [**200 ft**] display cable.
    - c. Safeties and Alarms:
      - 1) Air Proving.
        - a) Unit shuts down on alarm.
      - 2) Dirty Filter.
      - 3) Life Safety Alarm.
        - a) Unit shuts down on alarm.
      - 4) Condensate Overflow.



- a) Compressor and humidifier lockout on alarm.
- 5) Circuit 1 **[& 2]** high pressure switch.
  - a) Compressor lockout on alarm after 3 failures in 10 minutes or failure to reset after 30 seconds.
- 6) Circuit 1 **[& 2]** low pressure switch.
  - a) Compressor lockout on alarm after 3 minutes start delay.
- d. Controls up to 2 stages of cooling, 2 stages of heating, and 1 stage of humidification.
- e. Component run time data.
- f. Real time clock (time stamped alarms).
- g. Sensors:
  - 1) Temperature Control: Space mounted **[temperature]** **[temperature/humidity]** sensor.
  - 2) **Fan Speed Control:** Space mounted **[temperature]** **[temperature/humidity]** sensor.
  - 3) Freecooling Control: Pipe mounted temperature sensor.
  - 4) Static Pressure Control: Ducted mounted Static Pressure sensor.
- h. BMS communication: **[None]** **[BACnet MSTP]** **[BACnet IP]** **[Modbus]**.

K. Accessories

- 1. Condensate pump: **[None]** **[Compact, 20 ft lift]** **[Medium capacity, 20 ft lift]** **[Plenum rated, 30 ft lift]**
  - a. Condensate pump power: **[115V]** **[Fused connection at unit]**.
- 2. Smoke detector: **[None]** **[Field, duct mounted]**.
- 3. Firestat: **[None]** **[Field, duct mounted]**.
- 4. Water-leak detector: **[None]** **[Probe-type]** **[Cable-type]**.
- 5. Vibration isolation: **[None]** **[Hanging spring vibration isolators]**.
- 6. Hose Kit: **[None]** **[36 inch flexible stainless-steel hose kit with shut-off valves, strainer, manual air vent, and <automatic> <manual> balancing valve]**.
- 7. Disconnect: **[None]** **[Main power, non-fused]** **[and]** **[Condenser power, non-fused]**.
- 8. Electrical protection: **[None]** **[Voltage/Phase Monitor]**.

PART 3 - EXECUTION

3.1 EXAMINATION

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- A. Examine the area and conditions where the unit will be installed for compliance with the installation requirements for the unit before equipment installation.
- B. Verify roughing-in for unit(s) is coordinated with actual locations of piping, duct, and electrical connections before equipment installation.
- C. Do not install equipment until unsatisfactory conditions are remedied.

### 3.2 INSTALLATION

- A. Install unit in accordance with manufacturer's requirements and approved documentation.
- B. Complete all ductwork, refrigerant piping, control, power wiring, and other service connections in accordance with Division 23 and Division 26.
- C. Verify unit has been leak checked in accordance with manufacturer's requirements and provided with an appropriate starting charge when breaking vacuum.
- D. Prepare inspection report confirming that the unit is ready for startup.

### 3.3 STARTUP AND FIELD QUALITY CONTROL

- A. Engage a factory-authorized service representative to test and inspect components, assemblies, equipment installation, and final connection.
- B. The factory-authorized service representative shall complete all tests as required by the manufacturer.
- C. Prepare and submit startup report to manufacturer.

### 3.4 CLEANING AND PROTECTION

- A. Protect unit from damage during construction operation. Do not leave access doors open or allow debris to accumulate in the unit. Promptly repair or remove and replace any damaged materials.
- B. After completing system installation and testing, balancing, and adjustments, clean unit and replace filters.

### 3.5 DEMONSTRATION

- A. Engage a factory-authorized representative to train owner's maintenance personnel to adjust, operating, and maintain the unit.

### 3.6 OCCUPANCY ADJUSTMENT

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- A. When requested within 12 months of substantial completion, adjust the system to meet the needs of the occupants to suit the actual operating conditions. Provide up to two visits to project for this purpose.

**END OF SECTION 23 81 23.13**