

SECTION 15837 INTERIOR CLASSROOM PACKAGED HVAC UNITS

SPECIFIER:

CSI MasterFormat 2004 number 23 81 19

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Factory-assembled, pre-charged, pre-wired, tested, and ready to operate packaged DX air-conditioning unit(s). Unit(s) shall include discharge air plenum and controls with performance requirements as indicated on Construction Documents. Units shall be provided with floor stand, wall louver, connecting sleeve and trim panels. Components shall be enclosed in a corrosion resistant, double walled insulated cabinet.
- B. Contractor shall provide M-DCPS all eligible FPL rebates pertaining to this equipment including but not limited to unit's Energy Efficient Ration (EER), Energy Recovery Ventilation (ERV) and CO2 sensor.

SPECIFIER: Delete paragraph 1.2B when not applicable to the project.

1.2 RELATED SECTIONS

- A. 15885 - Air Filtration Equipment.
- B. 15890 - Ductwork.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM), latest publications:
 - 1. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 2. ASTM D3794 - Standard Guide for Testing of Coil Coatings.
- B. Air Conditioning, Heating and Refrigeration Institute (AHRI) Standard 390 – Performance Rating of Single Package Vertical Air-Conditioners and Heat Pumps.
- C. Underwriters Laboratories (UL) Standard 1995 – Heating and Cooling.

1.4 QUALITY ASSURANCE

- A. Interior classroom units shall be certified in accordance with Air-Conditioning, Heating and Refrigeration Institute (AHRI) Standard 390 and listed under UL Standard 1995.
- B. The Energy Recovery Ventilator (ERV) performance shall be certified according to AHRI Standard 1060, Performance Rating of Heat Exchanger for Air-to-Air Energy Recovery Ventilation Equipment, and shall be listed in the AHRI Certified Products.

SPECIFIER: Evaluate the payback period(s) of an energy recovery feature or increase in energy efficiency that exceeds the requirements of the Florida Building Code – Energy, as required in the M-DCPS Design Criteria. Advise M-DCPS of the first cost and payback periods for approval for inclusion of such features in the project and specify them herein.

- C. Classroom package unit manufacturer shall make available to M-DCPS the documentation and/or certification necessary for submission to Florida Power and Light Company to secure rebates that may be available as detailed in their “Business Heating Ventilation and Air-Conditioning Program Standards.
- D. All replacement parts shall be available to the School District within 48 hours from their request.

1.5 SUBMITTALS

- A. Submit properly identified manufacturer’s literature, technical and performance data before starting the work.

1.6 WARRANTY

- A. Unit shall include 5-year parts warranty covering parts, compressor, heat exchange coils and ventilation packages.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Interior Packaged Classroom HVAC Units.
 - 1. Airedale
 - 2. Bard Manufacturing Company
 - 3. MarvAir, Inc.

2.2 EQUIPMENT

- A. Unit Casing:
 - 1. The exterior cabinet shall be constructed of minimum 20 gauge galvanized steel with a polyester finish. Exterior panels shall be of double wall construction consisting of perforated metal on the interior with a closed-cell insulation for sound absorption. The insulation shall not be subject to damage or air erosion during service. No fiberglass insulation shall be exposed to the airstream.
 - 2. Cabinet panels shall be fastened with tamper-resistant fasteners. All casing panels shall be easily removable for access.
 - 3. Front doors shall be hinged and lockable and provide access to all primary components and controls including condenser and evaporator motors, compressor, outside air ventilation system and ERV.
 - 4. Trim panels, finished to match the unit, shall be provided on both sides of the unit to provide a finished appearance and cover the space between the rear of the unit and

the building wall. Where the unit has a ducted supply similar trim panels shall extend the full height between the unit and the ceiling to cover the connecting ductwork.

5. Unit shall be suitable for right or left hand corner installation with proper clearances for air distribution and return.
6. Cabinet color shall be as selected by Architect/Engineer (A/E) from a palette of standard colors.
7. Sound level of the unit while operating at full load shall not exceed 45 dBA at a distance of 10 feet.

B. System Components:

1. Evaporator:

- a. Shall be driven by a variable speed electronically commutated type (ECM) motor to maintain the rated air flow from 0 to 0.5 inch WC of external static pressure. The motor shall be ramp up and down rate for quiet, smooth starting and stopping.
- b. Motor shall automatically adjust to proper blower speed in response to the ventilating mode and cooling demand.
- c. ECM motor shall be factory programmed to meet system requirements

2. Condenser:

- a. Fan shall be driven by a variable speed ECM motor for operation over a wide range of ambient conditions and low sound performance.

3. Energy Recovery Ventilator:

- a. The energy recovery ventilator cassette shall be a rotary wheel or cube type air to air heat exchanger. Cassette shall be complete with drive and seals to prevent air bypass. Intake and exhaust fans shall be driven by fractional horsepower motors and belts or ECM modulating motors.
- b. Exchanger media shall be washable with coil cleaner and water without damage to the media or desiccant. Desiccants subject to delamination or erosion are not acceptable.
- c. Incoming ventilation and exhaust air streams shall be filtered; intake and exhaust fans and associated speed controllers shall allow the two air streams to be independently modulated for positive pressurization of the classroom.
- d. Provide shutoff of ventilation outside air during unoccupied periods.

4. Condenser, Evaporator and Reheat Coils:

- a. Coils shall be constructed of aluminum plate fins mechanically bonded to seamless copper tubes or all aluminum, micro-channel style for the evaporator.
- b. A hot gas reheat coil, controlled by a heat reclaim valve, shall allow humidity control through cooling and reheating of the discharge air to avoid overcooling the classroom while maintaining a set humidity set point. The reheat coil shall be sized to match the nominal sensible capacity of the evaporator coil.
- c. Condenser coils shall be factory coated with Heresite, Bronze Glo, Adsil, or other epoxy coating as approved by the A/E and M-DCPS.

- d. Acrylic coating shall provide antimicrobial properties providing resistance to microbial and fungicidal growth.
 - e. Coil coating shall meet ASTM D3794.
5. Drainage Pans:
- a. Unit shall have separate drain pans for the collection of condensate and incoming outdoor water infiltration. Pans shall be constructed of non- corrosive materials and sloped to provide positive drainage.
 - b. The unit shall have a single condensate connection at back and bottom of the unit. Trapping of the condensate shall be internal and located inside the unit casing.
6. Refrigeration System:
- a. The compressor shall be two stage, scroll type, fully hermetic. The compressor shall be mounted on an isolation mounting system and fitted with a factory installed sound attenuation jacket.
 - b. The refrigeration circuit shall include a thermal expansion valve, liquid filter dryer and suction and liquid access valves.
 - c. Unit shall be shipped from the factory with full operating refrigerant and oil charges.

SPECIFIER: Delete the following paragraph if no electric heat is required.

7. Heating:
- a. Unit shall have factory supplied electric resistance heat with capacity scheduled. Heater elements shall be nickel chrome and with built in protection components as required by the NEC and listed by UL or other OSHA approved Nationally Recognized Testing Laboratories (NRTL).
8. Plenums:
- a. Unit shall be supplied with a plenum to introduce conditioned air into the space or a suitable connection to a ducted distribution system where shown.
 - b. Plenums shall be internally acoustically and thermally lined at the factory with a closed cell insulation. No fibers shall be exposed to the air stream.
 - c. Front and side registers of plenum shall be of aluminum construction with fixed or adjustable louver blades. Registers shall have opposed blade balancing dampers.
 - d. Extension plenum trim covers extending from the top of the unit to the ceiling shall be provided to conceal the ducted connection where provided. Finish of the covers shall match the cabinet.
9. Wall Sleeve:
- a. A wall sleeve shall be constructed of galvanized steel finished to withstand a minimum of 1000 hours of salt spray protection when tested per ASTM B117

Standard. Sleeve shall be continuous from the outside wall to the rear of the unit for a weather tight installation.

- b. Sleeve shall be adjustable to accommodate wall opening height above the floor.
- c. A floor base shall be provided to raise height over 34" above finished floor where required.
- d. Filter: Disposable, 2-inch pleated, minimum MERV rating as specified in Section 15885.

10. Outside Air Louver:

- a. Unit manufacturer shall furnish the outdoor louver required for the building wall opening. Louver shall be certified to meet the Miami Dade County High Velocity Zone criteria for large missile impact resistance, air and water infiltration and wind load resistance as required by The Florida Building Code.
- b. Louver shall be designed to allow for the intake and exhaust of the condenser and outside ventilation air streams without impediment or mixing. The spacing and the design of the blades shall minimize the possibility of water intrusion.
- c. Louver assembly shall include a "bird screen" made of corrosion-proof welded wire mesh with maximum 1/2" x 1/2" openings.
- d. Louver shall have a removable core for servicing. Access to removable core shall use tamper-proof screws.
- e. Louver shall have a powder coat finish. Color shall be as selected by A/E from a standard palette of finishes.

11. Electrical:

- a. Unit shall have single point entry for line voltage.
- b. A disconnecting means shall be provided immediately accessible within the lockable cabinet.
- c. Overload Devices: Provide compressor and fan motors with both thermal and current sensitive devices.

12. Accessories:

- a. Controls: Shall be factory wired, 24 volt, microprocessor based, located in a readily accessible location and protected by a circuit breaker.
- b. Temperature and ventilating controls shall be BACnet compatible and capable of communicating with the existing or new Energy Management or Control System.
- c. A self-diagnostic routine shall assess the unit's operational status and indicate a fault when detected. The control system shall have the ability to be programmed locally and remotely.
- d. Thermostat shall be digital, and shall be protected within a clear key-lockable thermostat cover.

13. System Safeties:

- a. High and low pressure controls shall shut off the refrigeration system whenever the set limits are exceeded. A bypass feature shall allow the compressor to start and prevent nuisance tripping during low temperature startup.
- b. An adjustable anti-short cycling timer shall prevent the compressor from cycling.

- c. Units with 3-phase power shall include factory mounted phase rotation and phase failure protection.
- d. A condensate overflow sensing system shall monitor both indoor and outdoor drain pans and shut down the refrigeration system to prevent condensate overflow.

14. Temperature and Humidity Controls:

a. General:

- 1) Microprocessor control shall allow time of day operating program schedule, including set points for space temperature and relative humidity.
- 2) Controls shall show operational and indicate faults detected and described under "System Safeties" herein.

b. Sequence of Operation:

1) Cooling:

- a) Unit shall operate in the cooling mode to satisfy the set room temperature. Dehumidification shall not operate if the set relative humidity is within a programmed dead band or if the dehumidification mode is disabled.

2) Dehumidification:

- a) The unit dehumidification shall activate upon a rise in relative humidity above the set high limit. Dehumidification cycle shall energize a two position valve to divert the hot refrigerant gas to pass through the reheat coil. The cooling mode shall operate as required to provide a discharge temperature and humidity condition while the reheat coil shall raise the discharge temperature to satisfy the set space temperature and relative humidity.
- b) No electric heat shall be used for reheat of pre-cooled air.

SPECIFIER: Select the appropriate heating mode in paragraph below.

3) Heating:

- a) [In the heating mode the unit shall reverse operation of the refrigeration system to maintain the heating set point.] [In the heating mode the refrigeration system shall be de-energized and allow the electric heat to operate.]

SPECIFIER: Select the appropriate ventilation mode in paragraphs a) or b) below.

4) Ventilation:

- a) [Intake and exhaust airflow shall be modulating and respond to a CO2 controller. The air rates shall modulate, up to the scheduled outside air ventilation rate, to maintain the set CO2 setting while also maintaining a minimum differential between intake and exhaust to maintain the space at a positive pressure.]
- b) [Intake and exhaust airflow shall be individually adjustable and set to maintain space positive pressure desired.]
- c) During unit operation the energy recovery system shall be operational. Unit shall provide a means of closing off the intake and exhaust air streams during periods of non-occupancy and when off.

15. Refrigerants:

- a. HCF 134a.
- b. HCFC 410A.

PART 3 EXECUTION

3.1 INSPECTION

- A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.2 INSTALLATION

- A. Installation shall be done in accordance with the manufacturer's installation instructions.
- B. Vibration: After installation, adjust equipment to operate without noticeable vibration.
- C. Locate foundations, platforms, curbs and hangers for the proper installation of equipment.
- D. Coordinate the location of the unit with furniture, wall and overhead obstructions to provide required service clearances.

END OF SECTION