

## SECTION 15855

### AIR HANDLING UNITS

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Related Sections:

1. 15240 - Vibration Isolation.
2. 15885 - Air Filtration Equipment.
3. 15890 - Ductwork.

##### 1.02 REFERENCES

- A. Air Moving and Conditioning Association (AMCA): Standard 210 Fan Performance Testing.
- B. American National Standards Institute (ANSI): ANSI B3.16 Roller Bearings, Load Rating, and Fatigue Life.
- C. National Fire Protection Association (NFPA): NFPA 90A Air-conditioning and Ventilating Systems.
- D. Air-conditioning and Refrigeration Institute: Standard 410 Air Cooling and Heating Coils.
- E. Standard Mechanical Code - 1997 (SMC).

##### 1.03 SUBMITTALS:

- A. Shop Drawings, list of materials, cooling coil performance data, fan performance data, and fan curves. Performance data shall be certified by unit manufacturer.

##### 1.04 QUALITY ASSURANCE

- A. Cooling coils shall bear the ARI label.
- B. Air handlers and components shall be ARI certified.

#### PART 2 PRODUCTS

##### 2.01 MANUFACTURERS

- A. Air Handling Equipment:
  1. Carrier.

2. CTSI.
3. Dunham-Bush.
4. Environmental Technology.
5. Energy Recovery Ventilation Products, by Air Xchange.
6. Mammoth.
7. McQuay.
8. Trane.
9. Temptrol.
10. York.
11. Z-Duct Products by Des Champs, Natural Bridge Station, VA.

## 2.02 FACTORY FABRICATED AIR HANDLING UNIT

- A. Unit shall be of arrangement and type shown on Construction Documents with design capacities as scheduled. Design units for floor mounting. Central station air handler and components shall be ARI certified and complete with fans, coils, motors, v-belt drives, belt guards, drains, filter sections, and accessories as specified.
- B. Casing:
  1. Casing walls shall be fabricated of minimum 0.80" aluminum, continuous hot dipped galvanized steel, or black steel phosphatized and coated with baked enamel finish not lighter than 18 gage. Removable panels shall provide access to the interior of the unit.
  2. Interior walls shall be fabricated so that solid metal, aluminum, minimum 0.63", or other approved metal, separates the airstream from fiberglass, ductliners, and internal insulation.
- C. Fan Section:
  1. Fan section shall encase 1 double-inlet, double-width forward curved fan suitable for static pressures and air quantities indicated.
    - a. Fan wheel shall be dynamically and statically balanced at factory.
    - b. Maximum fan rpm shall be 25 percent less than the first critical speed. Fan wheel diameter shall be as indicated.
  2. Fan shaft shall be solid or hollow, ground and polished steel, and coated with rust inhibitor.
    - a. V-belt driven fan shall have variable-pitch motor sheaves and drives shall be designed for

- 50T overload capacity.
    - b. Drives shall be selected for the mean rpm of the drive to match the fan operating rpm at design fan rpm.
  - 3. Fan bearings shall be grease lubricated, ball bearings, self-aligning type. Bearings shall be designed for an average life of 200,000 hours. Provide extended lubrication lines with external grease fittings.
- D. Coil Section:
- 1. Coil section shall encase cooling coils and drain pan.
    - a. Arrange coils for horizontal air flow.
    - b. Provide a minimum of 6 rows for chilled water service.
    - c. Provide intermediate drain pans for multiple coils installation.
    - d. Coil headers shall be completely enclosed within the insulated casing with only connections extended through the cabinet.
  - 2. Drain pan shall be one of the following:
    - a. Stainless steel, double pan construction with the inner pan covered with a heavy coat of mastic, and thermally isolated from the exterior casing with 1 inch thick fiberglass insulation.
    - b. Welded heavy gage stainless steel, thermally isolated from the exterior casing with insulation of 1 inch thick fiberglass or non-moving air space with the equivalent R value.
  - 3. Tubing for coils shall be copper 1/2" to 5/8" outside diameter.
    - a. Fins shall be (aluminum) (copper) mechanically bonded by tubing expansion with a maximum spacing of 10 fins per inch unless noted otherwise.
    - b. Coils shall have supply and return connections on the same end.
  - 4. Refrigerant coils shall have venturi type refrigerant distributor arranged for down feed.
    - a. Proof test coils at 450 psig and leak tested at 300 psig air pressure under water, cleaned,

dehydrated and sealed with a dry nitrogen charge.

- b. Coils shall be suitable for a working pressure of up to 300 psig.

5. Chilled water coils:

- a. Tubing for coils shall be copper 1/2" to 5/8" outside diameter.
- b. Provide a minimum of 6 rows.
- c. Fins shall be (aluminum) (copper) mechanically bonded by tubing expansion with a maximum spacing of 10 fins per inch unless noted otherwise.
- d. Coils shall be tested by subjecting each coil to a minimum air pressure of 350 psig with the coil submerged in water.
- e. Coils shall have supply and return connections on the same end.

E. Filters:

- 1. As specified under Section 15885 - Air Filtration Equipment.

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*NOTE TO SPECIFIER: Roof mounted equipment requires acceptance by M-DCPS Building Committee on a per condition basis.*

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2.03 PENTHOUSE AIR HANDLERS AND OUTSIDE AIR HANDLING UNITS

- A. Units shall be of arrangement and type shown on Construction Documents with design capacities as scheduled. Units and components shall be ARI certified and complete with fans, coils, motors, drains, filter sections, and accessories as specified.

B. Casing:

- 1. Design casing for indoor or outdoor installation as required and leak tight against 2-inch negative static pressure.
- 2. Casing walls shall be fabricated of minimum 0.80" aluminum or continuous hot dipped galvanized steel, or black steel phosphatized and coated with baked enamel finish not lighter than 18 gage. Removable panels shall provide access to the interior of the unit. Casing shall be bolted or welded to a galvanized steel base channel designed for curb mounting.

3. Interior walls shall be fabricated so that solid metal, aluminum (min 0.63") or other approved metal, separates the airstream from fiberglass, ductliners, and internal insulation.
4. Seams shall be welded or bolted and sealed to prevent leaks.
5. If outdoor installation, cover external vertical seams with a "U" clip, welded in place, for additional weather protection.
6. If outdoor installation, aluminum and galvanized steel unit roofs shall be flanged on all four edges, pitched for drainage, and to overlap all 4 sides of units.
7. Roof shall be gasketed and secured to side panel flanges with stainless steel or self-tapping zinc coated screws.
8. Door sizes shall allow access to fan motor, coil, and inlet section.

C. Fan Section:

1. Multi-blade, forward curved fans shall be double width, double inlet.
2. Plenum fans, when used, shall be single inlet.
3. Fans shall be statically and dynamically balanced as an assembly with motor.
4. Fan housings shall be constructed of die-formed, streamlined inlets and side sheets.
5. Fan bearings shall be grease lubricated ball bearings.
6. Flexible boots shall be installed between the fans and unit casings.
7. Fans and motor assemblies shall be isolated from unit casings. Isolators shall be of spring type.

D. Coil Section:

1. Coils shall have galvanized steel casings and be mounted in the coil casing with the same end connections accessible for service for coil removal from the unit through the roof or through the piping enclosure.
2. Tubing:
  - a. Coils shall be copper 1/2" to 5/8" outside diameter.
  - b. Fins shall be (aluminum) (copper) mechanically bonded by tubing expansion with a maximum spacing of 10 fins per inch unless noted otherwise.
  - c. Coils shall have supply and return connections on the same end.

3. Refrigerant Coils:

- a. Provide with venturi type refrigerant distributor arranged for down feed.
- b. Coils shall be proof tested at 450 psig and leak tested at 300 psig air pressure under water.
- c. Clean, dehydrate, and seal with a dry nitrogen charge.
- d. Coils shall be suitable for a working pressure of up to 300 psig.

4. Chilled Water Coils:

- a. Tubing for coils shall be copper 1/2" to 5/8" outside diameter.
- b. Provide a minimum of 6 rows.
- c. Fins shall be (aluminum) (copper) mechanically bonded by tubing expansion with a maximum spacing of 10 fins per inch unless noted otherwise.
- d. Coils shall be tested by subjecting each coil to a minimum air pressure of 350 psig with the coil submerged in water.
- e. Coils shall have supply and return connections on the same end.

E. Dampers:

- 1. Return air, fresh air shall be aluminum parallel blade type and rotated on rustproof nylon bushings encased in a non-ferrous housing.
- 2. Damper motor mounting brackets shall be provided inside the unit casing for center driving of the damper sets.

F. Filters: As specified under Section 15885 - Air Filtration Equipment.

G. Penthouse air handlers shall have maximum dimensions as indicated.

H. Penthouse air handlers shall have roof curbs as indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Equipment shall be installed according to manufacturer's recommendation.

- B. Casing seams shall be airtight.
- C. Condensate drains shall prevent any accumulation of condensate inside air handlers. P-trap on condensate drain on unit shall have a vertical leg equal to the maximum static pressure of the air handler.
- D. Seal coils at perimeter to prevent air bypass and shall be installed to be completely drainable through header drains.
- E. Rigidly anchor units to roof slab to withstand wind velocities determined By American Society of Civil Engineers (ASCE) 7-98.
  - 1. Use ASCE 7-98 Exposure Category "C" for wind design at M-DCPS additions and new construction, except when required by a coastal building zone location to use Exposure Category "D".
  - 2. Use map wind speed of  $\pm 150$  mph.
  - 3. Wind load importance factor for educational buildings shall be 1.15.

END OF SECTION