

SECTION 15840
VARIABLE AIR VOLUME BOXES

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.
- B. Comply with Section 15050.

1.02 SUMMARY

- A. Furnish and install variable air volume boxes. Factory install temperature controls furnished by DDC Contractor.
- B. Types of variable air volume boxes specified in this section include variable air volume boxes with and without reheat coils.
- C. Related Work Specified in Other Sections:
 - 1. Testing, adjusting and balancing of variable air volume boxes.
 - 2. Temperature controls which are to be furnished under another section of the specifications and installed as work of this section.
 - 3. Power supply wiring from power source to power connection on fan powered variable air volume boxes. Include disconnects, except where specified as furnished by manufacturer or factory-installed: Division 16 Sections.
 - 4. Control wiring specified as work of Division-15 for Control Systems is work of that section.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including performance data for each size and type of variable air volume box furnished; schedule showing drawing designation, room location, number furnished, model number, size, and accessories furnished; and installation and start-up instructions.
- B. Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.
- C. Wiring Diagrams: Submit ladder-type wiring diagrams for electric power and control components, clearly indicating required field electrical connections.
- D. Maintenance Data: Submit maintenance data and parts list for each type of variable air volume box; including "trouble-shooting" maintenance guide. Include this data, product data, shop

drawings, and maintenance data in maintenance manual; in accordance with requirements of Division 1.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of variable air volume boxes with characteristics, sizes, and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Codes and Standards:
 - 1. ARI Compliance: Provide variable air volume boxes which have been tested and rated in accordance with ARI 880 "Industry Standard for Variable Air Volume Boxes" and bear ARI certification seal.
 - 2. NFPA Compliance: Construct variable air volume boxes using acoustical and thermal insulations complying with NFPA 90A "Air Conditioning and Ventilating Systems".

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver variable air volume boxes wrapped in factory-fabricated fiberboard type containers. Identify on outside of container type of variable air volume box and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in boxes.
- B. Store variable air volume boxes in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: (Boxes) Subject to compliance with requirements, provide variable air volume boxes of one of the following:
 - 1. Titus
 - 2. Metal*Aire
 - 3. Anemostat
 - 4. Nailor
 - 5. Envirotec
- B. Manufacturer: Bud Use (Valve) Subject to compliance with requirements, provide variable air volume boxes of one of the following:
 - 1. Phoenix Controls
 - 2. Tek-Air

2.02 VARIABLE AIR VOLUME BOXES

- A. Provide factory-fabricated and tested pressure independent variable air volume boxes as indicated, selected with performance characteristics which match or exceed those indicated on schedule.
- B. Casings:
 - 1. Minimum 22 gauge galvanized steel, internally lined with dual density glass fiber insulation which complies with UL 181 and NFPA 90A. All exposed insulation edges shall be coated with NFPA approved sealant to prevent entrainment of fibers in airstream. Provide minimum insulation thickness of 1/2 inch.
 - 2. Leakage: Construct casings such that when subjected to 1.5-in w.g. pressure for low pressure units, and 3.0-in w.g. pressure for high pressure units, total leakage does not exceed 1% of specified air flow capacity with outlets sealed and inlets wide open. Construct air dampers such that when subjected to 3.0-in w.g. inlet pressure with damper closed, total leakage does not exceed 1% of specified air flow capacity.
 - 3. Access: Provide airtight, gasketed, quick release access door or removable panels with quarter turn latches in casings to permit removal of the air flow sensor, and access to air dampers and other parts requiring service, adjusting, or maintenance.
- C. Air Dampers: Construct of heavy gauge steel that cannot corrode, does not require lubrication, and does not require periodic servicing. Damper shafts rotate in self lubricating bearings. Shaft shall be clearly marked to indicate damper position
- D. Hot Water Heating Coil: Factory installed. Tubes 1/2 inch OD copper mechanically expanded into aluminum fins spaced to minimize static pressure loss. Leak test coil with 250 psi hydrostatic pressure
- E. Controls: Electronic controls furnished by DDC system manufacturer shall be field installed by controls contractor on 20 gauge (min.) mounting panel. Controls shall be Bacnet tested.
- F. Identification: Provide label on each unit indicating Number, cfm range, cfm setting, and calibration curve (if required).

2.03 VARIABLE/CONSTANT VOLUME SUPPLY AND EXHAUST VALVES (AIRFOIL BELLOWS TYPE)

- A. Provide pneumatic operated air foil type valves with unit mounted vortex type air flow sensors and transmitters by Tek-Air systems. Valves shall be capable of variable volume, two position or constant volume operation as indicated on the drawings.
- B. Accuracy shall be $\pm 1.5\%$. Rate $\pm 0.5\%$ FS for flows above 500 FPM. Velocity range shall be 350 to 2000 FPM.
- C. The exhaust/supply air control valve shall be Connor Pneumavalves. Inlet velocities shall not exceed 1600 CFM.

- D. Pneumavalves shall consist of a stainless steel for exhaust of galvanized steel for supply casing which folds multiple airfoil shaped blades, manufactured of stainless steel. Inside each blade is an expandable bladder manufactured of EPDM rated for operation for temperatures up to 300°F. The bladder is inflated and deflated with the control air pressure from the E/P converter. The bladders then cause the airfoil blades to expand and contract against each other, modulating airflow.
- E. Coordinate control signals with ATC Contractor.

2.04 FUME HOOD EXHAUST VENTURI VALVES (CONSTANT VOLUME)

- A. General: Provide factory-fabricated and tested air terminals as indicated, selected with performance characteristics which match or exceed those required by this Specification and project equipment schedules.
- B. Acceptable manufacturers are limited to: Phoenix Controls, (Accel II), Triatek, and TSI.
- C. Application: Constant volume laboratory exhaust sources: Fumehoods, as identified on project drawings.
- D. The airflow control device shall be of the venturi control type unless otherwise indicated on the Contract Documents.
- E. The valve shall be pressure dependent over a 0.6" to 3.0" W.C. drop across the valve. Integral pressure independent assembly shall respond and maintain specific airflow within one second of a change in duct static pressure irrespective of the magnitude of pressure and/or flow change or quantity of airflow controllers on a manifold system.
- F. Valves shall be constructed of stainless steel (304) with continuous weld seam. Bearings shall be composite Teflon with stainless steel spring and polyester slider assembly. Valve body shall have flanged connections, predrilled for installation.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which variable air volume boxes are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF VARIABLE AIR VOLUME BOXES

- A. Install variable air volume boxes as indicated, and in accordance with manufacturer's installation instructions.
- B. Install each unit level and accurately in position indicated in relation to other work; and maintain sufficient clearance for normal service and maintenance, but in no case less than that recommended by manufacturer.

- C. Connect ductwork to variable air volume boxes in accordance with Division 15 Ductwork Sections. Do not connect with flexible duct work, or flexible connectors. Provide a minimum of 3 duct diameters of straight run to inlet of box.
- D. Provide downstream access door in duct if box is constructed without removable casing panels.

3.03 FIELD QUALITY CONTROL

- A. Upon completion of installation and prior to initial operation, test and demonstrate that variable air volume boxes, and duct connections to variable air volume boxes, are leak-tight.
- B. Repair or replace variable air volume boxes and duct connections as required to eliminate leaks, and retest to demonstrate compliance.
- C. Comply with USM IDAT per section 01810.

3.04 CLEANING

- A. Clean exposed factory-finished surfaces. Vacuum clean interior of unit casing, prior to final duct connections and start up. Comb damaged coil fins.

END OF SECTION 15840