

# Suggested Specifications

## Antec Controls Venturi FX Valve

### Division 23 – Heating, Ventilating, and Air Conditioning

### Section 23 09 00 – Instrumentation and Control for HVAC

The following specification is for a defined application. Antec Controls would be pleased to assist in developing a specification for your specific need.

#### PART 1 – GENERAL

##### 1.01 Section Includes

- A. Venturi FX Valve – Antec Controls Model VFX

##### 1.02 Related Requirements

- A. Section 01 30 00 – Administrative Requirements
- B. Section 01 40 00 – Quality Requirements
- C. Section 01 60 00 – Product Requirements
- D. Section 01 74 19 – Construction/Demolition Waste Management and Disposal
- E. Section 01 78 00 – Closeout Submittals
- F. Section 01 79 00 – Demonstration and Training

##### 1.03 Reference Standards

- A. All referenced standards in this section pertain to the most recent publication thereof, including all addenda and errata.
- B. AHRI 410 - Standard for Forced-Circulation Air-Cooling and Air-Heating Coils.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- D. ISO 9001 - Quality Management Systems – Requirements.
- E. ISO/IEC 17025 - General Requirements for the Competence of Testing and Calibration Laboratories
- F. NEC - National Electric Code.
- G. NIST – National Institute of Standards and Technology.
- H. UL 916 - Standard for Energy Management Equipment.
- I. UL 1995 - Standard for Heating and Cooling Equipment.

##### 1.04 Administrative Requirements

- A. Pre-installation Meeting: The contractor shall conduct a pre-installation meeting prior to the start of the work of this section, and require attendance by all affected installers.

##### 1.05 Submittals

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data shall be provided with data indicating configuration, general assembly, and materials used in fabrication, including catalog performance ratings that indicate air flow, static pressure, NC designation, electrical characteristics, and connection requirements.
- C. Shop Drawings shall indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.
- D. Certificates shall be issued to certify that the air coil capacities, pressure drops, and selection procedures meet or exceed specified requirements or coils are tested and rated in accordance with AHRI 410.
- E. Manufacturer's Installation Instructions shall indicate support and hanging details, installation instructions, recommendations, and service clearances required.
- F. Project Record Documents shall record actual locations of units and controls components and locations of access doors.
- G. Operation and Maintenance Data shall include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant-volume regulators.
- H. Manufacturer's warranty shall be submitted and ensure forms have been completed in Owner's name and registered with manufacturer.
- I. Maintenance Materials shall be furnished for the Owner's use in maintenance of the project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.

##### 1.06 Warranty

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide 60 month manufacturer warranty from date of shipment for air terminal units, integral sound attenuators, integral heating coils, and integral controls.

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## PART 2 – PRODUCTS

### 2.01 Manufacturer

- A. Basis of Design: Antec Controls
  - 1. Venturi FX Valve (VFX)
  
- B. Acceptable Manufacturers:
  - 1. The plans and specifications for the airflow control system are based on systems and equipment manufactured by Antec Controls.
  - 2. The Venturi FX Valve provider shall be an entity that designs, develops, manufactures and sells products and services to control the environment and airflow of critical spaces using a Quality Management System registered to ISO 9001.
  - 3. In strict accordance with this specification, alternative Venturi FX Valves and equipment shall only be considered for approval provided that the equipment is equal in every respect to the operational characteristics, capacities and intent of control sequences specified herein. Approval to bid does not relieve the laboratory airflow control system supplier from complying with the minimum requirements or intent of this specification.
  - 4. The manufacturer shall possess a certification of accreditation by the National Voluntary Laboratory Accreditation Program (NVLAP) for calibration laboratories, in accordance with ISO/IEC 17025. Reference Lab code 201067-0.
  - 5. Manufacturers submitting as alternate suppliers shall be in compliance with the Proposed Alternate Equipment described in Section 2.01 C.
  - 6. Other acceptable manufacturers can be submitted provided they meet the specifications.
  - 7. The engineer and owner shall be the sole judges of quality and equivalence of equipment, materials, methods and life cycle cost.
  - 8. Only those systems specifically named in this specification or by addendum shall be considered for approval. Other systems submitted after the bid opening shall be returned without review.
  
- C. Proposed Alternate Equipment
  - 1. Equipment:
    - a. The Venturi FX Valve supplier shall provide a detailed proposal describing all elements of the Venturi FX Valve air control system. A schematic layout shall be provided, showing relations of these elements and a description of how they interact.
    - b. Technical specification data sheets shall be provided for all proposed system components and devices.
    - c. All proposed air control devices shall include discharge, exhaust and radiated sound power level performance obtained from testing in accordance with ASHRAE 130.
  - 2. Performance Verification:
    - a. The Venturi FX Valve supplier shall demonstrate a typical laboratory space that includes a general exhaust and a supply airflow control device for the purpose of verifying the Venturi FX Valve system's ability to meet the performance requirements indicated in this specification.
  
- D. Compliance Schedule:
  - 1. Any alternate Venturi FX Valve supplier shall provide a separate compliance schedule, which shall include the section, paragraph and subparagraph of these specifications, and a direct statement to indicate compliance or noncompliance with the requirements. For all areas of noncompliance, the supplier shall describe what specific and alternative approach has been taken and document the impact this will have on the sizing of the air delivery systems, the required cooling and heating capacities, energy costs and maintenance of the building.
  - 2. The alternate Venturi FX Valve supplier shall furnish a letter of compliance to the engineer, signed by a corporate officer of the Venturi FX Valve manufacturer, certifying the compliance and noncompliance items as stated above 10 days prior to the bid.

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## 2.02 Venturi FX Valves

### A. General:

1. The airflow control device shall be a venturi shaped anemometer using differential pressure to measure airflow equal to the Antec Controls model VFX.

### B. Performance Requirements:

1. The Venturi FX Valve assembly shall respond 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.
2. The airflow control device shall maintain a controlled accuracy within plus or minus five percent of signal over an airflow turndown range of no less than ten to one.
3. No minimum duct diameter entrance shall be required to ensure accuracy.

### C. Construction:

1. The airflow control device shall be constructed as:
  - a. Non-Corrosive: The airflow control device for non-corrosive airstreams, such as supply, and general exhaust, shall be 14-gauge aluminum (valve body). The airflow measuring probes shall be constructed of 316 stainless steel. The damper shall be constructed with two 24-gauge galvanized steel plates and a Teflon gasket, mounted on a zinc plated steel shaft.
    - i. Supply valves shall be insulated with ¾ inch flexible closed-cell polyethylene insulation with a flame spread index not exceeding 25 and a smoke-developed index not exceeding 50 when tested according to ASTM 84.
  - b. Coating Option – Phenolic Class P1: The airflow control device for corrosive airstreams, such as fume hoods and biosafety cabinets, shall be 14-gauge aluminum (valve body) with a baked on, corrosion resistant phenolic coating. The airflow measuring probes shall be constructed of 316 stainless steel. The damper shall be constructed with two 22-gauge, 316 stainless steel plates and a Teflon gasket mounted on a 316 stainless steel shaft.
2. The valve shall ship with all required components including silencers, hot water or electric duct heaters, matched for performance as required.
3. Valves using invasive airflow sensing technology, including cross-flow sensors and vortex shedding sensors, shall not be acceptable.

### D. Actuation:

1. For electrically actuated VAV operation for tracking pairs (supply and exhaust valves) in spaces without fume hoods, a low-speed electric actuator shall be used to modulate the airflow over the range of the specific valve size
2. A UL or CSA listed actuator shall be factory mounted to the valve. The actuator shall have sufficient torque to modulate the airflow against the maximum duct static pressure (within product specifications). Loss of main power shall cause the valve to maintain its last airflow position. This position shall be maintained until power is restored.
3. For electrically actuated VAV operation for fume hood laboratories (includes all supply, general exhaust, and fume hood valves in the space), a high-speed UL 916 listed actuator shall be factory mounted to the valve. Loss of main power shall cause the valve to position itself in an appropriate failsafe state (select all that apply):
  - a. Supply/make-up air valves (**select one**):
    1. Fail to closed position.
    2. Fail to last position.
  - b. General exhaust air valves (**select one**):
    1. Fail to open position.
    2. Fail to last position.
  - c. Fume hood exhaust air valves (**select one**):
    1. Fail to open position.
    2. Fail to last position.
4. This position shall be maintained constantly without external influence, regardless of the external conditions on the valve, within product specifications, until power is restored.

### E. Certification:

1. Each airflow control device shall be factory calibrated and their accuracy will be verified to plus or minus five percent of flow across the full operating range of the device.
2. The calibration laboratory shall measure volumetric flow rate with the following calibration accuracy, in accordance with the scope of accreditation to ISO/IEC 17025:
  - a. 30 standard cubic feet per minute to 100 standard cubic feet per minute shall have 4.0 percent expanded uncertainty.
  - b. 100 standard cubic feet per minute to 250 standard cubic feet per minute shall have 2.5 percent expanded uncertainty.
  - c. 250 standard cubic feet per minute to 4200 standard cubic feet per minute shall have 1.4 percent expanded uncertainty.
3. Each airflow control device shall be marked with device-specific factory calibration data. At a minimum, it should include the tag number, serial number, model number, characterization information (for electronic devices), and quality control inspection numbers. All information shall be stored by the manufacturer for use with as-built documentation

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## F. Accessories:

1. Hot Water Heating Coil – Product code VVHWC:
  - a. The hot water coil casing shall be constructed from a minimum 22-gauge, 0.032 inch galvanized steel, factory-installed on the terminal discharge with slip-and drive attachment for downstream ductwork.
    1. An optional gasketed access door shall be provided, located on bottom of unit.
    2. Coil handing shall be specified as [right hand] or [left hand] when looking into the coil inlet in the direction of airflow.
    3. The water coil shall be supplied with an access door located:
      - a. Upstream of the water coil in the terminal casing.
      - b. Downstream of the water coil in a common casing with the coil.
    4. The water coil access door shall be secured to the casing with (**select one**):
      - a. Screws.
      - b. Snap latches.
      - c. Quarter turn sash latches.
  - b. The water coil fins shall be 0.0045 inch aluminum fins, mechanically-bonded to seamless 0.50 by 0.016 inch copper tubes.
    1. Fins shall be formed in a high heat transfer sine wave configuration.
    2. [Standard] or [Oversized standard] coil shall have 10 fins-per-inch fin construction.
    3. [High capacity] or [Oversized high-capacity] coil shall have 12 fins-per-inch fin construction.
  - c. All water coils shall be hydrostatically tested to a minimum 390 pounds per square inch, with a minimum burst pressure of 1800 pounds per square inch at ambient temperature. All water coils are rated for a maximum of 300 pounds per square inch working pressure at 200 degrees Fahrenheit.
  - d. The water coil shall be certified in accordance with AHRI 410 and units shall bear an AHRI 410 label.
    1. An optional oversized casing shall be upsized to increase heat transfer with low supply water temperatures while reducing air side pressure drop.
2. Electric Heating Coil – Product code VVEC:
  - a. The electric heating coil shall be ETL listed to UL 1995 and CSA 22.2, and provided by the Venturi FX Valve manufacturer.
  - b. The electric coil casing shall be constructed from a minimum 20 gauge, 0.038 inch galvanized steel.
  - c. The heating elements shall be open wire nickel chrome construction, supported by ceramic insulators.
  - d. The integral control panel shall be a NEMA 250, Type 1 enclosure with hinged access door for access to all controls and safety devices.
  - e. The electric coils shall be provided with a primary automatic reset thermal cutout, a secondary manual reset thermal cutout, and a differential pressure airflow switch for proof of airflow.
  - f. The electric coil shall be provided with a silicon controlled rectifier (SCR) controller with analog control 0-10 VDC.
  - g. (**Optional**) The electric coil shall be provided with a non-fused door interlocking disconnect switch.
  - h. (**Optional**) The electric coil shall be provided with main-line fusing.
3. Silencer:
  - a. Construction:
    1. Casing shall be [galvanized steel], [304 stainless steel], or [316 stainless steel] construction with slip over valve connection on the valve side, and a slip-in-duct connection on the duct side.
    2. Casing seams and joints shall be lock-formed and sealed, to provide leakage-resistant construction.
    3. Perforated steel shall be adequately stiffened to insure flatness and form. Spot welds shall be painted as required.
    4. Internal baffles shall be provided with a radiused inlet and sloped tail.
    5. The silencer manufacturer shall provide a written test report showing silencer assemblies have Class 1 flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested according to ASTM E 84, NFPA 255 or UL 723.
    6. Standard acoustic media (**does not apply to packless silencers**):
      - a. Media shall be of acoustic quality, shot-free glass fiber insulation with long, resilient fibers bonded with a thermosetting resin. Glass fiber density and compression shall be as required to insure conformance with laboratory test data.
      - b. Media shall be packed with a minimum of 15 percent compression during silencer assembly.
      - c. Media shall be resilient such that it will not pull apart during normal applications, and shall resist settling, breakdown, and sagging from vibration. Media shall not rot, mildew, or otherwise deteriorate, and shall have sufficient flexibility to readily form around corners and curved surfaces.
      - d. Media shall not cause or accelerate corrosion of aluminum or steel.
      - e. Mineral wool is not permitted as a substitute for glass fiber.
  - b. Silencer type (**select one**):
    1. Packless (No-Media) Silencer:
      - a. Models shall not contain absorptive media. Attenuation shall be achieved with controlled impedance membranes and broadly tuned resonators.
    2. Fiberglass-cloth Lined Silencer:
      - a. The acoustic media sound shall be encapsulated in glass fiber cloth to help prevent shedding, erosion and impregnation of the glass fiber.
    3. Film Lined Silencer:

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- a. The acoustic media shall be completely wrapped with polymer film to help prevent shedding, erosion and impregnation.
- b. The wrapped acoustic media shall be separated from the perforated metal by a factory-installed acoustically transparent spacer. The spacer shall be flame retardant and erosion resistant.
- c. Mesh, screen or corrugated perforated liner will not be acceptable as a substitute for the specified spacer.

## PART 3 – EXECUTION

### 3.01 Examination

- A. Verify that conditions are suitable for installation.
- B. Verify that field measurements are as shown on the drawings.

### 3.02 Installation

- A. All temperature control wiring required for a complete and operating system, as herein specified, shall be furnished and installed by the temperature control contractor unless specifically shown on the electrical drawings.
- B. The term "wiring" shall be construed to include the use of conduit, wire, miscellaneous materials and labor, as required for installation and connection of the electrical control devices furnished as part of the control system or furnished by equipment suppliers.
- C. This wiring shall include all electrical connections required as specified in the sequence of operation. All devices and wiring required for interlocking HVAC equipment as specified in the sequence of operation shall be furnished by the temperature control contractor.
- D. All line and low voltage wiring materials and installation covered by this Section shall be in accordance with the latest revision of the National Electric Code and applicable local codes and shall carry the UL label where applicable.
- E. The ATC contractor shall install appropriately sized and fused 24 VAC transformers suitable for NEC Class II wiring.
- F. All cables shall be furnished and installed by the ATC contractor. The ATC contractor shall terminate and connect all cables as required. The ATC contractor shall utilize cables specifically recommended by the laboratory airflow controls supplier.
- G. The mechanical contractor shall install all airflow control devices in the ductwork.
- H. The mechanical contractor shall provide and install all reheat coils and transitions that are not integral to the Venturi FX Valve.
- I. The mechanical contractor shall provide and install insulation as required.
- J. Each pressurization zone shall have either a dedicated, single-phase primary circuit or a secondary circuit disconnect.

### 3.03 System Start-up and Training

- A. System start-up shall be provided by a factory trained and authorized representative of the Venturi FX Valve manufacturer. Start-up shall include calibrating the fume hood monitor and any combination sash position/sidewall sensing equipment, as required. Start-up shall also provide electronic verification of airflow (fume hood exhaust, supply, general exhaust or return), system programming and integration to BMS (when applicable).
- B. The balancing contractor shall be responsible for final verification and reporting of all airflows. The factory trained and authorized representative of the Venturi FX Valve manufacturer shall be on hand to assist the balancing contractor in adjusting any airflow or velocity readings as required.
- C. The Venturi FX Valve supplier shall furnish a minimum of four hours of owner training by factory trained and certified personnel. The training shall provide an overview of the job specific airflow control components, verification of initial fume hood monitor calibration, general procedures for verifying airflows of air valves and general troubleshooting procedures.
- D. Operation and maintenance manuals, including as-built wiring diagrams and component lists, shall be provided for each trainee.

### 3.04 Field Quality Control

- A. See Section 01 40 00 - Quality Requirements, for additional quality requirements.

### 3.05 Cleaning

- A. See Section 01 74 19 - Construction Waste Management and Disposal for additional cleaning requirements.

### 3.06 Closeout Activities

- A. See Section 01 78 00 - Closeout Submittals for closeout submittals.
- B. See Section 01 79 00 - Demonstration and Training for additional closeout requirements.

END OF SECTION 23 09 00