Suggested Specifications

Antec Controls Compounding Pharmacy Airflow Control System

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. Compounding Pharmacy Airflow Control System

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. USP 797 – Standard for Compounding Sterile Preparations
D. USP 800 – Standard for Safe Handling of Hazardous Drugs
E. ASHRAE Standard 130 – Methods of Testing for Rating Ducted Air Terminal Units.
F. ISO 9001 – Quality Management Systems – Requirements.
G. ISO/IEC 17025 – General Requirements for the Competence of Testing and Calibration Laboratories
H. NEC – National Electric Code.
I. NIST – National Institute of Standards and Technology.
J. UL 916 – Standard for Energy Management 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 airflow, 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.

PART 2 – PRODUCTS

2.01 Manufacturer

A. Basis of Design: Antec Controls by Price
   1. Compounding Pharmacy Airflow Control System

B. Acceptable Manufacturers:
   1. The plans and specifications for the Compounding Pharmacy Airflow Control System (CPACS) are based on systems and equipment manufactured by Antec Controls by Price.
   2. The compounding pharmacy airflow control system 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 compounding pharmacy airflow control systems 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 compounding pharmacy 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.
   5. Manufacturers submitting as alternate suppliers shall be in compliance with the Proposed Alternate Equipment described in Section 2.01C.
   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 compounding pharmacy airflow control system supplier shall provide a detailed proposal describing all elements of the compounding pharmacy airflow 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 airflow 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 compounding pharmacy airflow control system supplier shall demonstrate a typical pharmacy space that includes a general exhaust and a supply airflow control device for the purpose of verifying the compounding pharmacy airflow control system's ability to meet the performance requirements indicated in this specification.
      b. All travel and lodging costs to witness the performance verification shall be the responsibility of the compounding pharmacy airflow control system supplier.

D. Compliance Schedule:
   1. Any alternate compounding pharmacy airflow control system 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 compounding pharmacy airflow control system supplier shall furnish a letter of compliance to the engineer, signed by a corporate officer of the compounding pharmacy airflow system manufacturer, certifying the compliance and noncompliance items as stated above 10 days prior to the bid.

2.02 Compounding Pharmacy Air Control System

A. General:
   1. The Compounding Pharmacy Airflow Control System (CPACS) shall be pressure independent, and be furnished and installed to control the compounding pharmacy environment.

B. Performance Requirements:
   1. While occupied, the compounding pharmacy airflow control system shall hold constant the volume of supply air into the room to operate the room at the lowest possible airflow rates necessary to maintain temperature control, achieve minimum ventilation rates, and maintain compounding pharmacy pressurization in relation to adjacent spaces.
   2. The CPACS system shall be direct digital control (DDC) type.
   3. Each compounding pharmacy shall have a dedicated CPACS system. The CPACS system shall be independent and standalone from the building automation system.

4. The CPACS shall be capable of operating as a standalone system, and as a system integrated with the Building Management System (BMS) directly through BACnet without the use of field servers or gateway devices.
5. The system shall not use or rely on information from controllers in other compounding pharmacy rooms or from outside spaces to control functions within its compounding pharmacy room.
6. 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.

C. Airflow Control Device – General:
1. See specification section 23 XX XX Airflow Control Devices – Venturi FX Valve
2. See specification section 23 XX XX Airflow Control Devices – Venturi Valve

D. Actuation:
1. See specification section 23 XX XX Airflow Control Devices – Venturi FX Valve
2. See specification section 23 XX XX Airflow Control Devices – Venturi Valve

E. Room ventilation, pressurization, supply and general exhaust control: (Volumetric Offset) (**Pick One**)
1. The CPACS shall use volumetric offset control to maintain room pressurization. The system shall maintain proper room pressurization polarity (negative or positive) regardless of any change in room/system conditions. Systems achieving room pressurization control using differential pressure measurement are unacceptable.
2. The CPACS shall operate the space at the lowest possible airflow rates necessary to maintain temperature control, achieve minimum ventilation rates, and maintain compounding pharmacy pressurization in relation to adjacent spaces.
3. Biological safety cabinets (BSC) or compounding aseptic containment isolators (CACI) shall be provided with a constant volume / 2-position (**Pick One**) airflow control device.
4. The CPACS shall continuously calculate the difference between the total exhaust airflow and the total supply airflow in the space, including any constant volume, or two position exhaust devices. The general exhaust valve shall modulate to maintain the room volumetric offset setpoint.
5. The CPACS shall continuously monitor each compounding pharmacy space using a thermal MEMS style sensor designed to measure differential pressure with adjacent spaces.
6. The CPACS shall display the room pressure for the Ante Space, Non Hazardous Drugs compounding space, and the Hazardous Drugs compounding space on a single high resolution touchscreen display located inside the Ante Space. See specification section 23 XX XX – Room Pressure Monitor.

F. Room ventilation, pressurization, supply and general exhaust control: (Pressure Control) (**Pick One**)
1. The CPACS shall control the supply and exhaust/return airflow in order to maintain a user defined pressure differential with adjacent spaces. Systems achieving room pressurization control using volumetric offset control are unacceptable.
2. The CPACS shall use an electronic device utilizing a flow-through style sensor, designed to measure the differential room pressure between adjacent spaces and display the information on a digital interface mounted outside the operation room.
3. Biological safety cabinets (BSC) or compounding aseptic containment isolators (CACI) shall be provided with a constant volume / 2-position (**Pick One**) airflow control device.
4. The CPACS shall operate the space at the lowest possible airflow rates necessary to maintain temperature control, achieve minimum ventilation rates, and maintain compounding pharmacy pressurization in relation to adjacent spaces.
5. The CPACS shall continuously measure the compounding pharmacy differential pressure in relation to an adjacent space. The general exhaust valve shall modulate to maintain the room pressure setpoint.

G. Room temperature control:
1. The CPACS shall maintain the room temperature at set point by varying the supply airflow (if applicable) and supply air temperature. Supply air temperature shall be varied by modulating a reheat coil.
2. Upon a call for heating, the make-up/supply air volume shall target the minimum airflow allowed by the room air change rate. The reheat valve shall modulate to maintain the room setpoint while ensuring that the supply air temperature stays within specified limits.
3. Upon a call for cooling, the make-up/supply air volume shall increase toward the maximum cooling airflow target to bring the room air temperature down to the room temperature setpoint. The reheat valve shall close.
4. While the room setpoint temperature is satisfied the make-up/supply air volume shall target the minimum airflow allowed by the room air change rate. The reheat valve shall modulate to maintain the room setpoint.
5. The temperature control algorithm shall be tunable to ensure thermal comfort is maintained.

H. Occupancy Control:
1. The CPACS shall have the ability to change the minimum ventilation and temperature control set points, based on the occupied state, in order to reduce energy consumption when the space is not occupied.
2. The occupancy state may be set by either the BMS as a scheduled event or through the use of a local occupancy sensor.

a. Any BMS command shall be given priority over a local occupancy sensor

3. While in unoccupied mode and the room temperature is between the unoccupied heating and cooling room temperature setpoints, the make-up/supply air volume shall be reduced to the minimum unoccupied target. The reheat valve shall be closed.
4. If the room temperature increases above the unoccupied cooling setpoint or decreases below the unoccupied heating setpoint, the make-up/supply air volume shall increase to the occupied heating/cooling targets and the reheat valve modulated as required. Once the room temperature is brought back to within the unoccupied heating/cooling setpoints, the supply air volume is once again reduced to the minimum unoccupied target and the reheat valve closed.

I. Integration into building management system:
1. The entire CPACS shall be configured from a single access point. Systems that rely on users to start up each room control device from separate access points are not permitted.
2. The CPACS shall be native BACnet for integration into the building management system.
3. No protocol conversion gateway devices are acceptable for interfacing with a BACnet building-level network.
4. The CPACS shall employ a room-level network to ensure that loss of BMS communication does not affect the room airflow control or result in a loss of room pressure.
5. A native BACnet MS/TP connection is to be provided for each space.
6. Where no BMS exists, the CPACS supplier shall provide a Multi Variable Monitor to be used as a standalone front end system. The monitor shall be capable of providing trend data for room pressure, temperature, humidity and air change rate at a minimum. See specification section 23 XX XX – Multi Variable Monitor

J. Humidity monitoring (**optional**):
1. The CPACS thermostat shall be provided with an embedded humidity sensor. The humidity reading shall be made available to the BMS system for monitoring and/or air handler humidity control.

K. Room Pressure Monitoring (**optional**):
1. The ORACS shall be provided with a room pressure sensor.
2. The room pressure shall be monitored at all times with reference to the adjacent space.
3. The room pressure reading shall be available to the BMS system.

L. Multi-Variable Monitor (**optiona**l):
1. See specification section 23 XX XX – Multi-Variable Monitor.

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 all routers and repeaters in an accessible location in or around the designated compounding pharmacy.
F. The ATC contractor shall install appropriately sized and fused 24 VAC transformers suitable for NEC Class II wiring.
G. 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 compounding pharmacy airflow controls supplier.
H. The mechanical contractor shall install all airflow control devices in the ductwork.
I. The mechanical contractor shall provide and install all reheat coils and transitions that are not integral to the venturi valve.
J. The mechanical contractor shall provide and install insulation as required.
K. 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 CPACS manufacturer. Start-up shall also provide electronic verification of airflow (supply, make-up, 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 CPACS manufacturer shall be on hand to assist the balancing contractor in adjusting any airflow or velocity readings as required.
C. The CPACS 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