

PART 1 - GENERAL

1.01 General:

- A. Laboratory ventilation system will ensure the health and safety of laboratory occupants.
- B. Room pressurization control will utilize airflow tracking to vary the volume of supply air into a space and fume hood/general exhaust air out of the space to maintain both minimum ventilation and airflow balance. The Building Management System (BMS) will control temperature and humidity.
- C. Supply and exhaust airflows will be controlled by a stand alone control system that is interconnected to the BMS.
- D. Designer will provide complete fume hood control sequence of operations in 23 09 93.

1.02 Codes and standards: Refer to CODES AND STANDARDS in Design Standards Section IIe

1.03 Performance:

- A. Provide 100% field testing per ASHRAE 110 and meet 4.0AI0.05 containment of tracer gas.
- B. Average fumehood face velocity = 100 fpm +/- 10% at all times and specifically at 18 inch sash height. No point will be lower than 80 fpm or higher than 120 fpm.
- C. Response time: Meet or exceed ASHRAE 110.
- D. Flow rates within 10% of set point at all times.
- E. Electrical signaling response must transpire and stabilize within one second after completion of sash movement. Resultant sash opening airflow rate must stabilize within five seconds.

1.04 Room pressurization with fume hoods

- A. Use venturi valves or single blade dampers, high speed actuators and volumetric offset control to maintain room pressurization.
- B. Laboratory control system to continuously determine the supply airflow and the exhaust airflow.
- C. Laboratory ventilation system to maintain proper room pressurization polarity regardless of any change in room/system conditions such as the raising and lowering of any or all fume hood sashes or rapid changes in duct static pressure.

D. Fail air control valves to last position upon loss of control or power.

1.05 Room pressurization without fume hoods

A. Single-blade dampers and non-high speed actuators may be used, in which case pressurization control will be by Siemens Building Technologies only.

1. Single-blade dampers will be specified under Division 23
2. Designer will consider flow feedback system in VAV areas to meet needs of user.

1.06 Air change rate: Designer to provide calculations indicating the design ACH for each lab.

1.07 Laboratory sound criteria to be established by designer. UAF Facilities Services suggests levels not exceed NC55.

PART 2 - PRODUCTS

2.01 General: Basic fume hood control system will include devices such as fume hood sash sensor, fume hood monitor, air terminal devices, control panels and all associated low voltage wiring, pneumatic tubing and all necessary accessories to implement an integrated system as specified.

A. Laboratory fume hood controls approved manufacturers: Phoenix Controls Corporation and Siemens Building Technologies. Alternate Brand Request or Substitution Request required.

1. Fully integrated, stand-alone controls system
2. Closed or open loop control. Averaging sensors, through the wall sensors or airflow crosses may not be used for airflow tracking.
3. Device sound levels and pressure losses comparable to listed manufacturers.
4. Manufacturer must provide evidence of at least five years experience in fully integrated laboratory fume hood control and instrumentation work and evidence of similar installations in last two years.
5. Manufacturer must have technical/service personnel within the State of Alaska.
6. Manufacturer must demonstrate periodic calibration and maintenance requirements of equipment

B. All laboratory fume hood control equipment to be of a single manufacturer.

C. Manufacturer will include costs for any interconnectivity to UAF BMS that is beyond requirements stated in this section.

1. Manufacturer will provide all requirements for control air, control and power wiring.

2.02 Control/Alarming devices: Provide devices to accomplish the following functions:

A. Maintain room pressurization by varying airflow in a linearized manner using volumetric tracking.

B. Maintain constant fume hood face velocity as sash is raised and lowered.

C. Modify room ACH to accommodate changes in conditions and heating/cooling needs.

D. Provide fume hood user with face velocity readout, airflow alarm and emergency/purge function.

E. Measure sash position and provide precise, instantaneous values to controller.

2.03 Air terminal devices:

A. Provide linear flow performance characteristics with sufficient turndown to ensure that all airflows specified can be maintained.

B. Use only venturi type air valves or approved single blade dampers, pressure independent over the specified differential static pressure operating range. Minimum 16 gauge. spun aluminum. Refer to Division 23 for further information.

C. Minimum airflow control accuracy: +/- 5% of actual reading over the entire rated airflow range of each device.

D. Factory calibrated in accordance with NIST to specific requirements of project.

E. Components suitable for non-corrosive, corrosive or highly corrosive airstreams.

2.04 Submittals: O&M Manual will be reviewed at Submittal period and returned to manufacturer for update. Resubmit as Project O&M Manual. Conform to Division 01 requirements. O&M Manual to include:

A. Valve Schedule

B. Schematic diagram including depictions of all major equipment/devices.

1. Labels with device name, project device number and manufacturer part numbers.

2. Indicate mechanical and electrical interconnections to related equipment/devices.

3. List room locations. Typical installations may be depicted as long as associated room numbers are listed.
4. All drawing title blocks will include manufacturer location/contract information and project information including Project Name/Number.

C. Wiring diagrams

1. Include major internal and external connections.

D. Sequence of Operations: Reproduce from Contract Documents.

E. Equipment Parts List and Products Data.

F. Maintenance methods.

2.05 Interconnectivity: Interface with UAF campus Building Management System.

A. Manufacturer will provide and install necessary devices and wiring terminating at UAF BMS panels provided by Siemens Building Technologies. BMS control panel locations will be indicated on construction drawings. SBT will terminate industry standard fume hood control system wiring in SBT panels.

B. Minimum interface: (4) hardwired points:

1. Temperature override.
2. CFM output.
3. Emergency override alarm.
4. Low fume hood flow alarm.

PART 3 - EXECUTION

3.01 Control panels: Mount controllers, relays, switches, etc. in enclosed control panels, in a readily accessible location and in close proximity to control devices.

3.02 Designers will indicate fume hood control system power supply provisions on contract documents. Coordinate power requirements with Siemens Building Technologies and Division 26. Require fume hood controls installer to be responsible for any needs other than those depicted.

3.03 Controls contractor shall be responsible for providing all power services required under this section. Installation shall conform with the Division 26 specifications.

3.04 Quality:

- A. Manufacturer's system to be 100 percent field tested and installed in accordance with ASHRAE 110.
- B. A qualified, independent testing company to perform fume hood tests on each hood to determine face velocity, airflow patterns and response times.

3.05 Warranty:

- A. The manufacturer to review the system for proper installation and warrant the system for parts and labor for one year after installation. The manufacturer to include one visit at the end of the warranty period to confirm that the system is operating as commissioned.
- B. Manufacturer to calibrate fume hood controls, pressure transmitters and air sensors at the end of the warranty period. A written report to be submitted detailing the results and any work that was done. Calibration per ASHRAE 111 or AMCA 210.

END OF SECTION