

SECTION 23 09 13

INSTRUMENTATION AND CONTROL DEVICES FOR HVAC
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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fan Inlet Electronic Air and Temperature Monitoring Devices.

1.2 RELATED SECTIONS

- A. Section 01 81 13 – LEED Requirements.
- B. Section 08 91 00 – Louvers.
- C. Section 23 30 00 – HVAC Air Distribution.
- D. Section 23 33 13 – Dampers.
- E. Section 23 37 00 – Air Outlets and Inlets.
- F. Section 25 50 00 – Integrated Automation Facility Controls.
- G. Section 25 90 00 – Integrated Automation Control Sequences.

1.3 REFERENCES

- A. Underwriters Laboratory (UL) 873 – Temperature and Airflow Indicating Equipment.
- B. ANSI/AMCA 610-06 – Laboratory Methods of Testing Airflow Measurement Stations for Performance Rating.
- C. RoHS 2002/95/EC – Restriction of Hazardous Substances.

1.1 ACTION SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
- B. Product Data: For each product to be used, including:
 - 1. Storage and handling requirements and recommendations.
 - 2. Submit installation, operation and maintenance documentation.
- C. Sustainable Documentation Submittals: LEED Rating System.
Subparagraph below applies to LEED-CS; LEED-NC, LEED-CI, and LEED for Schools.
 - 1. Certificates for Credit EA 1 - Optimize Energy Performance: Design the building envelope and building systems to maximize energy performance.
 - a. Select one of the four compliance path options. Use a computer simulation model to assess energy performance of the HVAC system using air

- measurement and controls. Quantify energy performance as compared to a baseline HVAC system.
2. Certificates for Credit MR 4 - Recycled Content: Increase demand for building products that incorporate recycled content materials, therefore reducing impacts resulting from extraction and processing of new virgin materials.
 - a. Percentage of recycled content showing cost and percentage(s) of post-consumer and/or post-industrial content, and the total cost of materials for the air monitoring device.
 3. Certificates for Credit EQ 1 – Outdoor Air Delivery Monitoring: Provide capacity for ventilation system monitoring to help sustain occupant comfort and well-being.
 - a. For mechanically ventilated spaces provide a direct outdoor airflow measurement device capable of measuring the minimum outdoor air flow rate with an accuracy of plus or minus 15% of the design minimum outdoor air rate for each mechanical system, as defined by ASHRAE 62.1-2007.
- D. Product Schedule: For control devices. Use same designations indicated on Drawings.

1.2 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: For each type of device, for tests performed by a qualified testing agency.
 1. Submit product data sheets for airflow measuring devices indicating minimum placement requirements, sensor density, sensor distribution, and installed accuracy to the BAS control system.
 - a. The combined accuracy of all components that make up the air measuring device shall meet the performance requirements of this specification throughout the measurement range.
- C. Field Quality-Control Reports:
 1. Submit a test data schedule of airflow measuring devices indicating compliance with specified accuracy at minimum and maximum airflow rates.
- D. Sample Warranties: For manufacturer's warranties.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 1. The manufacturer of the products specified in this section shall have a minimum of ten years experience producing air measuring products and shall have licensed third party test verification of equipment performance.
 2. The manufacturer shall have implemented the management of quality objectives, continual improvement, and monitoring of customer satisfaction to assure that customer needs and expectations are met.
 3. Manufacturer shall be International Organization for Standardization (ISO) 9001 accredited.
- B. Installer Qualifications:
 1. USGBC LEED Compliance: The Work of this section shall be in accordance with applicable portions of the U.S. Green Building Council's LEED Green Building Rating System. Refer to Divisions 23 and 26 Sections and other related documents bound herein for purposes of complying with this requirement.
- C. LEED Product Qualifications:

1. Air measuring devices licensed to bear AMCA Certified Ratings Seal. Ratings based on tests and procedures performed in accordance with AMCA 511 and comply with AMCA Certified Ratings Program.
2. Recycled Content: Provide product that incorporate recycled content materials. The air measuring device shall consist of: extruded aluminum recycled content 45% by weight, fabricated sheet aluminum recycled content 28% by weight.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer, material, and location of installation.
- B. Store materials in a dry area indoors, protected from damage and in accordance with manufacturer's instructions.
- C. Handling: Protect materials and finishes during handling and installation to prevent damage.
- D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.5 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.6 WARRANTY

- A. Manufacturer shall provide standard limited warranty for instrumentation and control devices for a period of five years (60 months) from date of installation, no more than 60 months after shipment from manufacturing plant. When notified in writing from the Owner of a manufacturing defect, manufacturer shall promptly correct deficiencies without cost to the Owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Ruskin Company; 3900 Dr. Greaves Road, Kansas City, Missouri 64030. Tel: (816) 761-7476.
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 AIRFLOW/TEMPERATURE MEASUREMENT DEVICES

- A. Product: Fan Inlet Airflow Temperature Measuring Station (AFTMS) shall be model EFAMS with EAMP020 Control Transmitter as manufactured by Ruskin Company.
 1. Single Source Responsibility: To ensure compatibility, the same manufacturer shall provide both the airflow/temperature measuring probe(s) and control transmitter for each measurement location.

- B. System Description: Airflow and temperature measuring station (AFTMS) shall be capable of monitoring and reporting the airflow and temperature at each fan inlet location scheduled through two or four sensing circuits and a control transmitter that communicates with the building automation system (BAS). Sensing circuit shall be designed for operation in a wide range of environments, including high humidity and rapid thermal cycling. Sensors shall terminate at a router containing a multiplexer circuit. Multiplexer shall include a microprocessor that collects data from each printed circuit board (PCB) and digitally communicates the average airflow and temperature of sensing point to the microprocessor-based control transmitter. UL Plenum rated CAT5e communications cable with square terminal connectors, dust boot covers and gold plated contacts shall link sensors to the router and router to control transmitter. Control transmitter shall feature a 16x2 character alphanumeric LCD display, digital offset/gain adjustment, continuous performing sensor/transmitter diagnostics and a visual alarm to detect malfunctions. LCD shall be field adjustable to display either I.P or S.I. units.
1. Individual sensors shall include one or more sensor circuits encased in an UL 94 flame rated, high impact, ABS shroud with a minimum Rockwell Hardness of 109 per ASTM D785 and a thermal deflection value of 200 degrees F (93 degree C). Each sensor circuit shall consist of an epoxy coated ambient thermistor, an epoxy coated heated thermistor and a microprocessor mounted to a (PCB). The Sensor circuit cables terminates at the Multiplexer/Router in RJ45 connectors.
 2. Multiplexer/Router shall digitally communicate the average airflow and temperature to the microprocessor-based control transmitter.
 - a. Communications and Power Cable: 10 feet (3048 mm) increments up to 50 feet (15240 mm) as scheduled or required.
 3. Control transmitter shall be capable of processing up to 8 independent sensing points per airflow measuring location and shall operate on a fused 24 VAC supply. Transmitter output shall be field adjustable 4-20 mA or 2-10 VDC.
 - a. The transmitter operating temperature range shall be -25 degree F to 140 degree F (-32 degree C to 60 degree C) and housed in a dust proof indoor enclosure. Control transmitter enclosure shall be installed in a dry location.
 - b. Transmitter shall be compatible with any fan inlet sensor and not require field matching.
 - c. Communications with the building automation system (BAS) shall be accomplished through one of the following interface options: Analog output signal: Field selectable, fuse protected and isolated, 0-10VDC or 4-20mA (4-wire)
 - d. Analog signals between the probe and transmitter are not acceptable.
 - e. Pitot arrays and Vortex shedding flow meters are not acceptable.
 - f. Devices that use "chip" type thermistors or that do not have 2 thermistors at each sensing point are not acceptable.
- C. Sensor Performance:
1. Each Sensor shall be calibrated at a minimum of 16 airflow rates and have an accuracy of +/-2% of reading over the entire operating airflow range. Each sensor assembly shall be calibrated to standards of the National Institute of Standards and Technology (NIST).
 2. Each temperature sensor shall be calibrated at a minimum of 3 temperatures and have an accuracy of +/-0.15 degree F (+/-0.07 degree C) over the entire operating temperature range. Each temperature sensor shall be calibrated to standards of the National Institute of Standards and Technology (NIST).
 3. The combined accuracy of all components that make up the air measuring device shall meet the performance requirements specified throughout the measurement range.
 4. Multiple sensor circuits shall be equally weighted and averaged by the sensor multiplexing unit and communicate digitally to the control transmitter.

5. The operating temperature range for the sensor assembly shall be -20 degree F to 160 degree F (-29 degree C to 71 degree C). The operating humidity range for the sensor assembly shall be 0-99% RH (non-condensing).
- D. Fan Inlet Sensor Probe Assemblies:
1. Low profile sensor housings shall follow the contour of the fan inlet bell to reduce pressure drop and affect on fan performance.
 2. The operating airflow range shall be 0 to 10,000 fpm (3048 mpm) unless otherwise indicated on the plans.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Inspect areas to receive monitoring devices. Notify the Architect of conditions that would adversely affect the installation or subsequent utilization of the air measuring system. Do not proceed with installation until unsatisfactory conditions are corrected.
- B. Representative shall review and approve final placement and operating airflow rates for each measurement location indicated on the plans.
- C. If opening preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION

- A. An authorized factory representative shall coordinate probe placement with the installing contractor, in accordance with the manufacturer's installation recommendations.
- B. A written report shall be submitted to the consulting mechanical engineer if any measurement locations do not meet the manufacturer's placement requirements.

END OF SECTION