

SECTION 234316 - ELECTRONIC AIR CLEANERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Modular air ionization system: Needlepoint Bipolar Ionization (NPBI) system components.

B. Related Requirements:

1. Section 233119 "HVAC Casings" for customized housings used for particulate air filters.
2. Section 233416 "Centrifugal HVAC Fans" for customized fan and filter units.
3. Section 234133 "High-Efficiency Particulate Air Filtration" for high-efficiency particulate air filters used in combination with particulate air filters.

1.2 ACTION SUBMITTALS

- A. For each product. Include dimensions; operating characteristics; required clearances and access; rated flow capacity, including initial and final pressure drop at rated airflow; efficiency and test method; fire classification; furnished specialties; and accessories for each model indicated.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.

C. Shop Drawings

1. Plans, elevations, sections, details, and attachments to other work.
2. Show filter assembly, dimensions, materials, and methods of assembly of components.
3. Setting drawings, templates, and requirements for installing anchor bolts and anchorages.
4. Diagrams for power, signal, and control wiring.

D. Product Data: Manufacturer's technical product data for air ionization systems.

1. Schedule of ionization systems indicating unit designation, number of each type required for each unit and application.
2. Data sheet for each ionization system type, and accessories furnished. Indicate construction, sizes, and mounting details.
3. Ion performance data for each type of ionization device furnished, presented in ions/cc, measured in still air, at a distance of 1 inch (25 mm) from the source.
4. Product drawings detailing physical, electrical and control requirements.

1.3 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Data: Certificates for components from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Proof of compliance with UL 2998, "Environmental Claim Validation Procedure for Zero Ozone Emissions from Air Cleaners."

a. Submit certificates that are listed on one of the following websites:

- 1) <https://spot.ul.com/>.
- 2) <https://sustainabilitydirectory.intertek.com/home>.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Submit operation and maintenance data and recommended spare parts lists. Include 10 years of operations and energy costs.
- B. Warranty certificate.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An NRTL.
- B. Manufacturer Qualifications: Company that specializes in manufacturing products specified in this Section.
 1. ISO 9001-compliant manufacturing process.
 2. ISO 9001: 2015-compliant administrative processes.
 3. Documented Experience: 10 years, minimum.
 4. Furnish services of manufacturer's qualified representative to inspect finished air ionization system.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Delivery: In factory-fabricated shipping containers.
 1. Identify product type and installation location on outside of container.
 2. Do not crush or bend product packaging.
- B. Storage: In original packaging. Protect products from weather and construction work traffic.
 1. Store products indoors, and in accordance with the manufacturer's written storage instructions.

1.7 WARRANTY

- A. Furnish equipment having manufacturer's warranty against defects in material and workmanship for a period of three years after date of shipment.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. ASHRAE Compliance:

1. Comply with applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality"; Section 5 - "Systems and Equipment"; and Section 7 - "Construction and Startup."

B. Comply with the following:

1. AHRI 850.
2. FCC Part 18.
3. NFPA 70.
4. **[NFPA 90A] [NFPA 90B]**.
5. UL 2043.
6. UL 867.
7. UL 2998.

C. Substitutions: No substitutions

2.2 CAPACITIES AND CHARACTERISTICS

A. Provide NPBI air cleaning system at locations indicated on Drawings.

B. Project Design:

1. Submit calculations using formulas required by ASHRAE 62.1 to validate acceptable indoor air quality at quantity of outside air scheduled and air cleaning technology specified.

C. Maximum Ozone Emissions: In accordance with limits stated in UL 2998.

1. Products not certified in accordance with UL 2998 are unacceptable.
2. Provide products listed on UL SPOT or Intertek Sustainability product database(s) as UL 2998-compliant. Products not listed in either database are unacceptable. Submit manufacturer's test report showing compliance with UL 2998.

D. Humidity: Provide ionization devices:

1. That do not require preheat protection when relative humidity of entering air exceeds 85 percent.
2. That are suitable for relative humidity from zero to 100 percent, condensing, without causing damage, deterioration, or dangerous conditions within air ionization system.

E. Ion Systems:

1. Ionization Output: Provide systems that produce positive and negative ions. Unipolar ionization devices are unacceptable.
2. Ionization Device Enclosures: Provide corrosion-resistant, non-metallic materials. Configure enclosure without thermal bridging.

3. Provide units certified to UL 2998, "Environmental Claim Validation Procedure for Zero Ozone Emissions from Air Cleaners."
 4. Provide integral alarm dry contacts, SPST (NO), rated 5.0 A at 250 V ac.
 5. Mounting: Magnets or self-tapping sheet metal screws.
- F. Design Requirements for Coil Cleaning Installations:
1. Provide ionization units having manufacturer's recommended number of electrodes and power generators, sized to system air flow.
 2. NPBI Electrodes:
 - a. Materials: Carbon fiber clusters having minimum 45000 needles each.
 - 1) Metal electrodes are unacceptable.
 - 2) Bipolar ionization tubes manufactured of glass, composite, mica, or similar dielectric materials are unacceptable.
 - b. Provide electrodes in 6-inch (152-mm) sections for field assembly by installer to cover entire finned width of coil.
 - c. Provide one modular ionization bar for every 5 ft. (1524 mm) of coil height.
 - d. Electrode Spacing: 0.5 to 1 inch (13 to 25 mm) apart.
 - e. Output: 140 million ions/cc per inch (5.5 million ions/cc per mm) of bar, measured 1 inch (25 mm) from carbon fiber brushes.
 - f. Ionization Bars:
 - 1) Length: 12 ft. (3660 mm) maximum.
 - 2) Power Supply:
 - a) Energize ionization system continuously.
 - b) Provide ac power supply for field installation, capable of powering four ionization bars requiring 20 W each.
 - c) Include integral on/off switch and LED "power on" light.
 - d) Include BAS interface alarm dry contacts, SPST (NO), rated 5.0 A at 250 V ac.
 - e) Power Source: [24 V ac] [110 V ac] [or] [208 to 240 V ac].
 3. Power Supply Enclosure Class: NEMA 250, Type 4.
- G. Control Requirements:
1. NPBI Devices:
 - a. Internal short-circuit protection.
 - b. Overload protection.
 - c. Automatic fault reset circuit breakers. Units having fuses are unacceptable.
 - d. Provide integral alarm dry contacts, SPST (NO) rated 5.0 A at 250 V ac.
 2. Ionization Output: Provide unit that varies ion output in proportion to airflow velocity.

2.3 COIL SOLUTION - AC VOLTAGE OUTPUT

- A. Description: Factory-fabricated, modular bipolar ionization device.

1. Basis-of-Design Product: Subject to compliance with requirements, provide GPS Air; Model GPS-iMOD, or comparable product.
2. Capacity and Characteristics:
 - a. Materials: Composite and carbon fiber.
 - b. Capacity: 50 to 250 cfm per inch (0.55 to 2.8 cu. m/minute per cm) of length.
 - c. Voltage selector switch and illuminated on-off switch.
 - d. LED operational status light.
 - e. Six high-voltage output connections.
 - f. Alarm Contacts: SPDT, dry.
 - g. Auxiliary terminals for connection of remote ion sensor.
 - h. Temperature Range: Minus 40 to plus 140 deg F (Minus 40 to plus 60 deg C).
 - i. Relative Humidity Range: Zero to 100 percent.
 - j. Power Entry: UL listed, line cord with three-prong plug.
 - k. Power Unit Dimensions (L x W x H): 9.00 x 3.25 x 4.75 inches (229 x 83 x 121 mm).
 - l. Ionizer Bar Dimensions (H x W): 1.60 x 0.75 inch (41 x 19 mm).
 - 1) Length per Section: 6 inches (152 mm), having nine brushes per section.
 - 2) Maximum Assembled Bar Length: 144 inches (3658 mm).
 - 3) Provide rare earth magnets for mounting.
 - m. Power Unit Weight: 4.63 lb (2.1 kg).
 - n. Ionizer Bar Weight: 0.24 lb (113 g) per 6-inch (152-mm) section.
3. Electrical Characteristics:
 - a. Electrical Listings: UL, cUL/ETL.
 - b. Compliance and Certifications: CARB, CE, FCC Part 18, IAQP, OSHPD Seismic (OSP), UL 867, UL 2043, UL 2998.
 - c. Input Voltage: [24 V ac or dc] [110 V ac] [240 V ac], [50 Hz] [60 Hz].
 - d. Amperes: [0.5 A at 24 V] [0.12 A at 110 V] [0.065 A at 240 V].
 - e. Output Power: 5 kV RMS, [50 Hz] [60 Hz].
 - f. Total Ion Output: Minimum 140 million ions/cc per inch (5.5 million ions/cc per mm) of bar, measured 1 inch (25 mm) from carbon fiber brushes.
4. Options:
 - a. Ion Sensor: Provide GPS Air's "Model PS-iDETECT-P Ion Sensor" compatible with ionization device.

PART 3 - EXECUTION

- 3.1 INSTALLATION OF MODULAR AIR IONIZATION SYSTEMS HAVING AC VOLTAGE OUTPUT
 - A. Installation of Modular Air Ionization System:

1. Install air ionization system between upstream MERV 6, or higher, 30 percent efficient particulate filter and downstream cooling coil.
2. Mechanical Installation:
 - a. Provide one ionization bar assembly on each coil up to 60 inches (1524 mm) in height. Space bars maximum 60 inches (1524 mm) apart.
 - b. Install ionization bar to cover entire finned width of coil to nearest 6 inches (152mm) without exceeding finned width of coil.

3.2 CONTROL WIRE, CABLE AND RACEWAYS INSTALLATION

A. Comply with NECA 1.

B. Wire and Cable Installation:

1. Comply with installation requirements in Section 260523 "Control-Voltage Electrical Power Cables."
2. Comply with installation requirements in Section 271313 "Communications Copper Backbone Cabling."
3. Comply with installation requirements in Section 271513 "Communications Copper Horizontal Cabling."
4. Install cables with waterproof protective sheathing capable of withstanding continuous temperatures of 90 deg C with no measurable effect on physical and electrical properties of cable.
 - a. Provide shielded twisted pair cable. Connect shield at one end. Tape back and insulate shield at opposite end.
5. Terminate Wiring in Junction Box.
 - a. Clamp cable over jacket in junction box.
 - b. Install individual conductors in stripped section to have slack between clamping point and terminal block.
6. Terminate field wiring and cable not directly connected to instruments and control devices having integral wiring terminals using terminal blocks.
7. Install signal transmission components in accordance with IEEE C2, REA Form 511a, NFPA 70, and as otherwise indicated.
8. Perform continuity and megger testing on wire and cable after installation.
 - a. Remove cable that fails testing from site and replace with new.
 - b. Do not repair or splice cable between termination points.

C. Conduit Installation:

1. Comply with Section "260533 "Raceways and Boxes for Electrical Systems" for control-voltage conductors.
2. Comply with Section 270528 "Pathways for Communications Systems" for balanced twisted pair cabling and optical fiber installation.

3.3 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with "Quality Assurance" Article in this Section and in appropriate Sections in Division 01.

1. Manufacturer's Inspection and Training Services: Furnish services of manufacturer authorized representative to verify correct installation and perform training of Owner's staff.

3.4 STARTUP, COMMISSIONING, AND TRAINING

- A. Manufacturer's Startup Services: Provide startup supervision and training of Owner's personnel in the proper operation and maintenance of equipment.
- B. Commissioning Agent: Use Alpha Labs Air Ion Counter's "Model AIC2" and confirm, on installed units, that ion output meets value listed on product data sheet when both polarities are measured and added together. Measurement: **One inch (25 mm)** from electrode without airflow.
- C. Systems with Ionization Bars: Measure ionization output **one inch (25 mm)** away from electrodes without airflow and submit test report.
- D. Training: Train Owner's personnel on use and maintenance of system.

END OF SECTION 234316