

SECTION 23 41 10 - AIR PURIFICATION SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. This section describes the design, performance and installation of an ionization air purification system intended for use as part of another manufacturer's air handling unit or mounted on the duct as shown on the plans, details and equipment schedules.

1.2 REFERENCED CODES & STANDARDS

- A. The following codes and standards are referenced throughout. The edition to be used is that currently enforced by the authority having jurisdiction (AHJ) or in absence of such direction that referenced by the current enforceable IBC code or as indicated by the contract documents, except where specifically referenced by this section of the specifications.
 - 1. ASHRAE Standards 62 & 52
 - 2. National Electric Code NFPA 70
 - 3. UL 867 including ozone chamber test

1.3 QUALITY ASSURANCE

- A. The Air Purification System shall be a product of an established manufacturer in the USA and shall be manufactured and assembled in the USA.
- B. A qualified representative from the manufacturer shall be available to inspect the installation of the air purification system to ensure installation in accordance with manufacturer's recommendation.
- C. Technologies that do not address gas disassociation such as UV lights, powered particulate filters and/or polarized media filters shall not be considered. Uni-polar ion generators shall not be acceptable. "Plasma" particulate filters shall not be acceptable.
- D. The Air Purification Technology shall have been tested by UL or Intertek/ETL to prove conformance to UL 867-2007 including the ozone chamber testing and peak ozone test for electronic devices. All manufacturers shall submit their independent UL 867 test data with ozone results to the engineer during the submittal process. All manufacturers shall submit a copy with their quotation. Contractors shall not accept any proposal without the proper ozone testing documentation.

1.4 SUBMITTALS

- A. Submit manufacturer's technical product data for ion generators including:
 - 1. Schedule of plasma generators indicating model number and quantity of each type required for each unit/application.
 - 2. Submittal sheet for each type of plasma generator and accessories furnished; indicating construction, dimensions, electrical data, and mounting details.

3. Product drawings detailing all physical, electrical and control requirements.
4. Copy of UL 867 independent ozone test.

B. Operating & Maintenance Data: Submit O&M data and recommended spare parts list.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of products shall be in factory fabricated shipping cartons. Identify on outside of carton the type of product contained within. Avoid crushing or bending.
- B. Store in original cartons and protect from weather and construction work traffic.
- C. Store indoors and in accordance with the manufacturer's recommendation for storage.

1.6 WARRANTY

- A. Equipment shall be warranted by the manufacturer against defects in material and workmanship for a period of twelve months after shipment or eighteen months from owner acceptance, whichever occurs first. Labor to replace equipment under warranty shall be provided by the owner or installing contractor.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The air purification system(s) shall be of the size, type, arrangement and capacity indicated and required by the furnished equipment and shall be manufactured by Plasma Air International (www.plasma-air.com). Equal systems manufactured by Global Plasma Solutions, AtmosAir and Top Product Innovations are acceptable.

2.2 BI-POLAR IONIZATION DESIGN AND PERFORMANCE CRITERIA

- A. Each piece of air handling equipment, so designated on the plans, details, equipment schedules and/or specifications shall contain a plasma ion generator with bipolar ionization output as described here within.
- B. The Bi-polar Ionization system shall be capable of:
 1. Effectively killing microorganisms downstream of the bipolar ionization equipment (mold, bacteria, virus, etc.).
 2. Controlling gas phase contaminants generated from human occupants, building structure, furnishings and outside air contaminants.
 3. Reducing space static charges.
 4. Reducing space particle counts.
 5. When mounted to the air entering side of a cooling coil, keep the cooling coil free from pathogen and mold growth.
 6. All manufacturers shall provide documentation by an independent NELEC accredited laboratory that proves the product has minimum kill rates for the following pathogens given the allotted time and in a space condition:
 - a. MRSA: 99.5% in 60 minutes or less
 - b. E. Coli: 93.5% in 30 minutes or less

AIR PURIFICATION SYSTEMS

- c. H1N1: 86.6% in 60 minutes or less
 - d. Aspergillus: 74.8% in 60 minutes or less
- C. The bipolar ionization system shall operate in such a manner that equal amounts of positive and negative ions are produced. Single pole ion devices shall not be acceptable.
 - 1. Airflow rates may vary through the full operating range of a VAV system. The quantity of air exchange shall not be increased due to the air purification system requirements.
 - 2. Velocity Profile: The air purification device shall not have a maximum velocity profile.
- D. Humidity: Plasma Generators shall not require preheat protection when the relative humidity of the entering air exceeds 85%. Relative humidity from 0 - 100%, condensing, shall not cause damage, deterioration or dangerous conditions to the air purification system.
- E. Ionization Equipment Requirements:
 - 1. Electrode Specifications (Bi-polar Ionization):
 - a. Each plasma generator with bipolar ionization output shall include the required number of electrodes and power generators sized to the air handling equipment capacity.
 - b. Electrodes shall be energized when the main unit disconnect is turned on and the fan is operating.
 - c. Ionization output when tested in the occupied space shall be between 500 and 800 ions/cm³.
 - d. Manufacturer shall demonstrate that no voltage potential exists due to exposed electrical components in the duct system or plenum. Exposed needles protruding into the air stream will not be accepted.
 - 2. Air Handling Units Greater than 7200 cfm:
 - a. Ion generators for air handling units 7200 cfm and larger shall be Plasma Air's BAR product furnished in a linear or bar mounted configuration so as to minimize the space required for installation. Ionization BAR shall be no more than 3" deep in the direction of airflow.
 - b. The mechanical contractor shall mount the plasma ionization BAR and connect it to the remote mount power supply panel using only low voltage wiring. Low voltage wiring shall be defined as 12V. The use of high voltage cabling (600V or higher) shall not be acceptable due to safety concerns.
 - c. The remote mount power supply panel shall be capable of directly accepting voltage of 12V DC or 24V AC. The panel shall have an on/off switch, ionizer indicator LED, and a set of dry contacts which will feedback ionizer functionality. Dry contacts that indicate power available only shall not be acceptable.
 - d. For systems that do not include a feedback electronic signal indicating ion production, provide a duct mounted ion sensor powered from 12V DC or 24V AC. Ion sensor to be user adjustable from 500 to 20,000 ions per cm³ and contain a dry contact BMS interface. To be clear, for systems that only indicate power available to the ionizer, vendor must provide duct mounted ion sensor described herein.
 - e. Needles on air handler mounted units shall be recessed for safety and to avoid fouling of any exposed needles.
 - 3. Small Capacity Air Handling Units, Fan Coils, and Unit Ventilators:
 - a. Ion generators for small capacity air handling units, fan coils units, and unit ventilators shall be brush type needlepoint units similar to Plasma Air model PA660 designed to be mounted at the fan inlet.
 - b. The unit shall be rated to treat up to 2,400 CFM per module. For airflows greater than 2,400 CFM, up to 3 module units shall be utilized.

AIR PURIFICATION SYSTEMS

- c. The PA660 housing is made from ABS plastic, contains an LED ionization output indicating LED, and an in-line 1 Amp fuse.
 - d. The unit shall be capable of directly accepting voltage of 12V DC or 24V AC. The panel shall have an on/off switch, ionizer indicator LED, and a set of dry contacts which will feedback ionizer functionality. Dry contacts that indicate power available only shall not be acceptable.
 - e. For systems that do not include a feedback electronic signal indicating ion production, provide an ion sensor powered from 12V DC or 24V AC. Ion sensor to be user adjustable from 500 to 20,000 ions per cm³ and contain a dry contact BMS interface. To be clear, for systems that only indicate power available to the ionizer, vendor must provide duct mounted ion sensor described herein.
 - f. The unit shall contain two (2) mounting feet and shall be configured so the needles are oriented perpendicular to the flow of air entering the fan wheel.
- 4. Certifications:
 - a. Bipolar ionization units shall be tested and listed by either UL or ETL according to UL Standard 867 – Electrostatic Air Cleaners. UL listings for standards other than 867 will not be acceptable.
 - b. The operation of the electrodes or bipolar ionization units shall conform to UL 867 with respect to ozone generation.
- F. Electrical Requirements:
 - 1. Ion generators shall contain a built-in power supply and operate on 24V AC and shall connect to the fan and common terminals of the air handling unit served. Ion generators requiring a loose 24V, 120V or 230V transformer or power supply shall not be accepted.
 - 2. Wiring, conduit and junction boxes shall be furnished and installed by the HVAC controls sub-contractor within housing plenums and shall be UL and NEC NFPA 70 approved.
 - 3. Furnish and install control relay to operate the ionizer when the supply fan is energized.
- G. Control Requirements:
 - 1. All plasma ion generators shall include internal short circuit protection, overload protection, and automatic fault reset. Manual fuse replacement shall not be accepted.
 - 2. All plasma ion generators shall include an external BMS interface to indicate ion generator status and alarm.
- H. Monitoring Devices:
 - 1. Provide to the owner a portable hand-held ion counter with a calibrated range of 0 to 20,000 ions/cm³ and an accuracy of +/- 25% within the specified range. Ion counter shall have automatic zeroing capability on 10-minute intervals.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall be responsible for maintaining all air systems until the owner accepts the building (Owner Acceptance).

3.2 ASSEMBLY & INSTALLATION: PLASMA GENERATOR WITH BI-POLAR IONIZATION

- A. All equipment shall be assembled and installed with a high level of workmanship to the satisfaction of the owner, architect and engineer.
- B. Any material damaged by handling, water or moisture shall be replaced by the mechanical contractor at no cost to the owner.
- C. All equipment shall be protected from damage on a daily basis throughout construction.
- D. Install unit at fan inlet or in fan section per manufacturer's recommendations.
- E. Provide all wiring through control relay to ionizer unit to allow unit to operate when supply fan is energized.

3.3 COMMISSIONING & TRAINING

- A. A manufacturer's authorized representative shall provide start-up supervision and training of owner's personnel in the proper operation and maintenance of all equipment.

END OF SECTION 23 41 10