

PUTNAM CITY SCHOOLS

Operations
5401 NW 40th
Oklahoma City, OK 73122

Request for Proposals

for

AIR PURIFICATION SYSTEM: BIPLAR IONIZATION

Date of release
March 1, 2021

Due Date
March 24, 2021
12:00 p.m.

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PREFACE

Technical contact for this project:

Cary Simmons,
Maintenance
Office: 405-495-6180 ext. 1431
Email: csimmons@putnamcityschools.org

District contact for this project:

Shbrone Brookings, Executive Director
Operations
Office phone: 405-495-5200 ext. 1212
Email: sbrookings@putnamcityschools.org

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1.0 PURPOSE

1.1 Putnam City Schools, also abbreviated as PCS for brevity, is requesting proposals from qualified vendors to provide and install Ionization Purification Devices in HVAC systems located throughout the district.

In using this method for solicitation, we are requesting your effort in seeking the best value for our requirements. To be entitled for consideration, proposals shall be presented in accordance with the instructions of this solicitation and within the timeframe specified. It shall be the responsibility of the selected vendor to meet all specifications and guidelines set forth herein. Putnam City Schools, at its discretion, determines the criteria and process whereby bids are evaluated and awarded. No damages shall be recoverable by any challenger as a result of these determinations or decisions by Putnam City Schools.

2.0 DISTRICT INFORMATION

2.1 Putnam City Schools has an active enrollment of ~20,000 students, attending a total of 27 schools: 18 elementary (K-5), 5 middle schools (6-8); 3 high schools (9-12); and 1 alternative high school. Putnam City Schools covers a large geographical area and is represented within the boundaries of Oklahoma City, Bethany, and Warr Acres.

3.0 SCOPE OF WORK

The Putnam City Public School District is seeking a vendor to provide Bipolar Ionization Air Purification devices installed in HVAC Systems at School Site located throughout the District. It is the intent of Putnam City to evaluate cost-effective solutions based on features, functionality, implementation difficulty, but primarily, price.

Price includes all required equipment, lifts/ladders for installation of the devices. Care should be taken during installation, damages caused to finished materials as a result of installation will be repaired under this scope of work at no additional cost to the District.

The bidder shall mount the Devices and wire it to the AHU control power (24VAC) as instructed by the Air Purification Manufacturer's instructions or line voltage subject to power available.

Duct Mounted devices to include insulation repair, duct sealing, and power hook-up. If power is not available at the location of the device, power should be extended as needed and is to be considered a part of this scope of work.

Refer to Exhibit A for additional scope of work and quantities of devices.

Work is to be complete for this Proposal no later than July 31, 2021.

This is a complete turnkey project.

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4.0 GENERAL INFORMATION:

4.1 Technical questions may be directed to Cary Simmons, Director Maintenance at csimmons@putnamcityschools.org.

4.2 Questions or requests for clarification should be directed to Shbrone Brookings, Executive Director of Operations at sbrookings@putnamcityschools.org

4.3 For the purpose of this proposal, the Bid Submission Form, must be completed in its entirety for all bidders. All new vendors must complete the “New Vendor Section” of the RFP.

4.4 Vendor’s monthly bill must itemize all charges for individually identifiable components of the proposed services, materials and support communication system, including all associated installation. Any ambiguous and/or undisclosed add-on charges found on the district's invoice(s) will be deemed as billing errors and removed from the invoice(s) prior to payment.

4.5 PCS is under no obligation to purchase goods or services totaling the amount proposed in your response; Vendor will only be paid for services rendered

4.6 Payment may be made for a single line item or partial service when the item or service has been satisfactorily installed or within thirty (30) days after the date of delivery and the receipt of a satisfactory invoice.

4.7 This Agreement states the total obligation of PCS to the vendor for compensation for the services to be performed hereunder. PCS shall pay vendor in accordance with the proposal made by the vendor and accepted by PCS. PCS shall pay vendor for the satisfactory performance of the work solicited, approved and accepted under this Agreement. Vendor acknowledges and agrees that this is a nonexclusive requirements type contract and PCS will utilize vendor's services on an as needed basis and as such PCS will only be responsible for payment for services requested that are satisfactorily performed and meet PCS's required specifications. Vendor further acknowledges and agrees that the value of this contract shall not exceed their proposed amount; however, PCS is under no obligation to solicit work totaling this amount and Vendor will only be paid for services rendered.

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5.0 TECHNICAL REQUIREMENTS

5.1 Vendor must have 24/7 local support available.

7.0 EQUIPMENT REQUIREMENTS

7.1 Necessary equipment for delivered service installed by the service provider must be labeled with Vendor Company Name, Date of Installation, and Installation Location.

7.2 Equipment to meet or exceed the included Air Purification Specifications 15861 Air Purification System. Refer to Exhibit B - Specification.

8.0 SUBMISSION REQUIREMENTS

8.1 Submit one PDF of your entire proposal package. Send the PDF response to sbrookings@putnamcityschools.org before the designated due date and time.

8.2 If any confidential and/or proprietary information is included, then each page containing such information must be stamped "proprietary". It is not acceptable to label the entire proposal as confidential and proprietary. All aspects of the proposal may be shared with USAC or the Oklahoma Corporation Commission without notice.

8.3 Proposals shall be submitted via email with the subject line: *2021 Air Purification System*.

8.4 No telephone or facsimile offers will be accepted.

8.5 Proposals shall not be withdrawn after they are delivered to PCS, unless vendor makes a request in writing to the Executive Director of Operations prior to time set for receiving proposals, or unless the Executive Director of Operations fails to accept or reject the proposals within sixty (60) days after the date fixed for receiving said proposals.

8.6 Proposals that contain irregularities of any kind and/or do not comply fully with solicitation documents may be rejected at the discretion of the Executive Director of Operations. Putnam City Schools shall not be liable for any costs associated or incurred by vendor in conjunction with preparation of documents.

8.7 By submitting a response, the vendor certifies: "that this proposal is made without prior understanding, agreement or connection with any corporation, company or person submitting a proposal for the same service and is in all respects fair and without collusion or fraud; that collusive pricing is understood to be a violation of State and Federal law and can result in fines, prison sentences and civil damage awards." It is agreed that all conditions of the solicitation, notice to proceed and/or purchase order of PCS shall be abided and that the person signing this proposal is authorized to bid for the vendor.

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8.8 Vendor shall submit with proposal the “Vendor Information” form. Failure to provide all information requested in complete and accurate detail may result in rejection of the proposal. If further information is required to provide responsibility such as providing copies of licenses, certificates, permits, etc., the vendor will be notified, in writing and given seven (7) days from notification to comply.

8.9 Vendor shall read and complete all applicable forms and submit with their proposal.

8.10 Vendor shall provide with proposal a copy of their current business license if required by the district.

8.11 Vendor shall submit the information requested in section “9.0 New Vendors” with their proposal. Each section must be titled as listed below.

9.0 NEW VENDORS

All new vendors to the district must complete this entire section. Failure to do so may disqualify the entire bid.

Business Qualifications (Response Section)

A. If a new vendor to the district, please provide a brief history of the company and organization with specific attention given to the appropriate divisions and subsidiaries responsible for services requested. The background history should include:

- Year founded
- Public or private enterprise
- Years involved in providing the requested service
- Total number of employees
- Total number of employees available in the Oklahoma City metro area to provide services for this account

Note: If the Vendor is a joint venture, or partnership; or, if the firm will have significant participation by a subcontractor – significant defined as 25% or more of the project revenues and/or responsibilities – then the information in A should be provided for each of the participating entities.

Relevant and Quality Experience (Response Section)

A. If a new vendor to the district, provide three (3) to five (5) references from K-12 urban school districts or business of a similar nature, (type of facility and size) for which your company is currently or previously (within last 3 years) providing services similar to the specifications of this solicitation. Provide the following information for each reference:

- Name and address of organization
- Name and title of primary contact with telephone number, fax number and e-mail address
- Description of the services provided including dates and scope of work for the job, including planning/budget/scheduled activities, and outside talents used. Outline the documentation, project tracking, and work product delivery methodologies used and which proved to be successful.

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- Also for each reference, provide information on an alternate contact person that has first-hand knowledge of the work you have done or are doing.

B. Proposed System (if different from Specified)

Provide a detailed description of the proposed system. Include diagrams with equipment, specifications.

C. Assurance Statement

New vendor to the district must provide a statement affirming and assuring that the prospective vendor's staff, network, and overall business practices will meet/exceed each of PCS's requirements. All prospective vendors responding to this proposal are required to demonstrate their networks reliability and dependability. All prospective vendors must clearly demonstrate their ability to handle the day-to-day business needs necessary to successfully manage an account the size of PCS; identify the specific account team (members, titles, roles) that will be assigned to PCS; provide detailed procedures for initiating account inquiries changes, and escalations.

D. Maintenance and Technical Support

The selected vendor will provide on-site basic and routine preventative maintenance functions including, but not limited to, adjustments, alignment, and replacements to equipment as requested and necessary to keep equipment in good working order. The selected vendor must provide 24 hours by 7 days-a-week on-site repair and technical support plan. The maintenance plan must also include a telephone number to the selected vendor's repair and technical support department. Any request(s) must be identified with a unique tracking identifier number (TIN) for records purposes. In cases requiring an on-site visit, the TIN must include an estimated-time-of-arrival (ETA) for the technician and be updated with an estimated-time-of-repair (ETR).

E. Proposed System.

If a new vendor to the district, provide a detailed description of the proposed system. Include diagrams with equipment.

F. Training and Implementation

If requested, the selected vendor will need to provide training to all designated members of the PCS staff on all set-up/configuration, installation, basic troubleshooting, maintenance and accompanying equipment if necessary. This training shall cover billing, customer service records, vendor processes, and service orders. Training can be conducted through a variety of means: web-based, on-site, and/or written materials. However, it should occur as soon as possible after commencement of services and should occur as often as needed to ensure that district's services and equipment are operating at an optimal level. An overview of how the prospective vendor proposes to provide the training to the PCS technical staff shall be provided with the bid submission.

9.0 EVALUATION

9.1 To be entitled for consideration, proposals shall be presented in accordance with the instructions of this solicitation and within the timeframe specified. It shall be the responsibility of the awarded vendor to meet all

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specifications and guidelines set forth herein.

9.2 An evaluation committee will evaluate each proposal. PCS, at its sole discretion, determines the criteria and process whereby proposals are evaluated and awarded. No damages shall be recoverable by any challenger as a result of these determinations or decisions by PCS.

9.3 Proposals that do not have pricing evaluated will not be considered for award.

9.4 Price Evaluation Formula:

Criteria to be evaluated on a 100-point scale.

9.5 Proposals will be evaluated on the following:

- Cost 40%
- Technical Capabilities 20%
- Business Qualifications 20%
- Relevant and quality experience 20%

9.6 The selected vendor will be contacted via email or phone after approval of the Board of Education.

10.0 AWARD

10.1 Please be advised that it is the policy of Putnam City Schools that all contracts be awarded on a strictly non-discrimination basis without regard to the race, gender or ethnicity of the vendor.

10.2 This contract shall be for one (1) base year with four (4) one-year available options to renew at the sole discretion of the Putnam City Schools Board of Education. The contract will be conditional upon the Vendor's ability to comply with requirements set forth in the solicitation documents.

10.3 Vendor shall not begin work without a purchase order issued by the Putnam City Schools.

10.4 Itemized invoice must be submitted to:

Putnam City Schools Operations
ATTN: Shbrone Brookings
5401 NW 40th Street
Oklahoma City, OK 73122

Invoices should include the PCS purchase order number and the ship-to location where the goods and/or services were delivered. Invoices that do not include this information will be returned to the vendor. Separate invoices are required for each purchase order.

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SCHOOL SITES

Apollo Elementary	1901 N Peniel, Bethany
Arbor Grove Elementary	4711 N. Tulsa, OKC
Central Elementary	5721 N.W. 39 th St. Warr Acres
Coronado Heights Elementary	5911 N. Sapulpa, OKC
James L. Dennis Elementary	11800 James L Dennis Dr. OKC
Downs Elementary	7501 W Hefner, OKC
Harvest Hills Elementary	8201 N W 104 th , OKC
Hilldale Elementary	4801 N W 16, OKC
Kirkland Elementary	6020 N Independence, OKC
Lake Park Elementary	8221 N W 30 th , Bethany
Northridge Elementary	8501 N W 82 nd , OKC
Overholser Elementary	7900 NW 36 th , Bethany
Rollingwood Elementary	6301 N Ann Arbor, OKC
Tulakes Elementary	6600 N Galaxie, OKC
Western Oaks Elementary	7200 N W 23 rd , Bethany
Wiley Post Elementary	6920 Britton Road, OKC
Will Rogers Elementary	8201 N W 122 nd , OKC
Windsor Hills Elementary	2909 N Ann Arbor, OKC
Capps Middle School	6400 NW 63rd Street, Warr Acres
Cooper Middle School	8001 Riverbend Blvd., OKC
Hefner Middle School	8400 N MacArthur, OKC
Mayfield Middle School	1600 N Purdue, OKC
Western Oaks Middle School	7200 N.W. 23 rd Bethany
PC High	5300 N W 50 th , OKC
PC West	8500 N W 23 rd . OKC
PC North	11800 N Rockwell, OKC
PC Center/Academy	5604 N.W. 41 st Warr Acres
Administration Building	5401 N.W. Oklahoma City, OK

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BID SUBMISSION FORM

This page must be included with your proposal.

BASE BID: Include the cost of providing all labor, material, equipment, supervision, services, insurance, fees, overhead and profit, etc. necessary or incidentally required for the installation of the devices

Words: _____

Dollars: \$ _____

UNIT PRICING: Unit pricing to include all labor, material, equipment, supervision, services, insurance, fees, overhead and profit, etc. necessary or incidentally required for the installation of the devices.

Item	Product or Service Description	Price per Unit:
1	DM-48	
2	FC-48	
4	iMOD- 48	
3	iMOD-60	
4	Alpha Labs Air Ion Counter Model AIC2	

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VENDOR INFORMATION FORM

RFP Name: AIR PURIFICATION SYSTEM

This form must be completed and returned with your bid.

1. Company Name: _____

2. Street Address: _____

3. City, State, Zip Code: _____

4. Primary Contact: _____

5. Telephone: (_____) _____ Fax: (_____) _____

6. E-mail: _____

7. Company web site: _____

8. State tax identification number and state issued from: _____

9. State of Incorporation: _____

10. Have any conditions or restrictions been placed by the company on this proposal that would declare it non-responsive? Yes No

11. Are you prepared to provide proof of insurance as required? Yes No

12. Has your company ever been debarred from doing business with any federal, state or local agency? If yes, please provide details including agency name, date and reason for debarment. Yes No

13. Has your company ever defaulted on a contract or been denied a bid due to non-responsibility to perform? If yes, please provide details. Yes No

Exhibit A – Scope of Work and Device Quantities

PUTNAM CITY SCHOOLS - **AIR PURIFICATION SYSTEM**

Scope of Work

This is a scope of work for the installation of ionizers at Putnam City Schools. Ionizers shall be installed based on the following specifications. Ionizers shall be Global Plasma Solutions devices.

- A. Contractor shall have prior experience on large, multi-site installations of GPS ionizers. The contractor will provide documentation of experience of these installs with the bid.
- B. All ionizers shall be tested with ion meter after installation to ensure proper saturation of ions per cubic centimeter, in each space. The target ion count is above 1500 ions/cm³.
- C. All transformers must be tested to ensure that the additional VA load, from ionizers, does not cause a voltage to drop below 24 VAC. In units where 24 volts is not available, the contractor will be responsible for supplying the power to the ionizer under this contract.
 - a. If VA load is too much for existing transformers, then additional transformers shall be required and installed under this contract.
- D. Contractor shall record model and serial number of each piece of HVAC equipment with an ionizer and install a new phenolic CNC'd label. The label will include unit number and room number or served location. Example (RTU-03/RM 113). Unit numbers and room numbers will be provided by Putnam City Schools. At the conclusion of the project, the contract will provide the district with a spreadsheet including all this information.
- E. Contractor shall Provide the District with One (1) Alpha Labs Air Ion Counter Model AIC2, instruction to be provided upon transmittal to the District.
- F. Warranty shall be 1 year parts and labor.

The specific model and quantity of ionizer shall be as follows, per school.

Exhibit A – Scope of Work and Device Quantities

High Schools

PC North High School

Putnam City High School

PC West High School

<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>
75	DM-48	13	DM-48	77	DM-48
128	FC-48	181	FC-48	97	FC-48
8	iMod-60	2	iMod-60	3	iMod-80
3	iMod-48	3	iMod-72		
		2	iMod-120		

Administration Buildings

Administration Building

PC Center/Academy

<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>
33	FC-48	3	DM-48
		120	FC-48

Middle Schools

Capps Middle School

Cooper Middle School

Hefner Middle School

<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>
133	DM-48	65	DM-48	103	FC-48
6	FC-48	1	iMod-65		
3	iMod-72	1	iMod-72		
4	iMod-90	1	iMod-60		
13	iRib-36	1	iMod-120		

Mayfield Middle School

Western Oaks M.S.

<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>	-	-
47	DM-48	80	FC-48	-	-
2	iMod-90				
10	FC-48				

Exhibit A – Scope of Work and Device Quantities

Elementary Schools

Apollo Elementary

<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>
45	FC-48	66	FC-48	54	FC-48

Arbor Grove Elementary

Central Elementary

Coronado Elementary

<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>
55	FC-48	71	FC-48	35	FC-48

Hilldale Elementary

Kirkland Elementary

Ralph Downs Elementary

<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>
63	DM-48	30	DM-48	83	DM-48
1	iMod-72	20	FC-48	8	FC-48
1	iMod-48	1	iMod-110		

Will Rogers Elementary

Northridge Elementary

Rollingwood Elementary

<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>
55	FC-48	55	DM-48	51	FC-48
		4	FC-48		
		1	iMod-100		

Wiley Post Elementary

Dennis Elementary

Lakepark Elementary

<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>
51	FC-48	66	FC-48	32	DM-48
				3	FC-48
				1	iMod-120

Tulakes Elementary

Harvest Hills Elementary

Overholser Elementary

<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>	<u>Qty</u>	<u>Type</u>
1	iRib-36	62	FC-48	59	FC-48
49	FC-48				

Western Oaks Elementary

Windsor Hills Elementary

Exhibit B - Specification

SECTION 15861-AIR PURIFICATION SYSTEM (FC-24, FC-48, DM-48)

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. This section describes the design, performance and installation of an 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 Electrical Safety Standard
 - 4. UL 2998 Certification - no ozone generation

1.3 RELATED WORK

- A. Testing, Adjusting and Balancing
- B. Facility Access and Protection
- C. Ductwork
- D. Filters
- E. Water and Refrigerant Piping
- F. Electrical Wiring
- G. Control Wiring

1.4 QUALITY & IP ASSURANCE

- A. Basis of design is Global Plasma Solutions. All other manufacturers requesting prior approval must submit product drawings, specifications and test results specified in section 2.2 at least four weeks prior to bid date.
- B. The Air Purification System shall be a product of an established manufacturer within the USA.
- C. 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.
- D. 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.
- E. Projects designed using ASHRAE Standard 62, IAQ Procedure shall require the manufacturer to provide Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2019 to validate acceptable indoor air quality at the quantity of outside air scheduled with the technology submitted. The manufacturer shall provide independent test data on a previous installation performed within the last

Exhibit B - Specification

two years and in a similar application, that proves compliance to ASHRAE 62 and the accuracy of the calculations.

- F. The Air Purification System shall have been tested by UL or Intertek/ETL to prove conformance to UL 867. Contractors shall not accept any proposal without the proper UL 867 electrical safety testing and ozone testing documentation.
- G. The manufacturer shall have UL 2998 certification proving the technology is ozone free and produces no more than 5 PPB as measured 2 inches away from the electronic air cleaner's output. Manufacturers without UL 2998 certification shall not be acceptable. ASHRAE 62.1-2019 requires all electronic air cleaners to have UL 2998 certification.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data for ion generators including:
 - 1. Schedule of plasma generators indicating unit designation, number of each type required for each unit/application.
 - 2. Data sheet for each type of plasma generator, and accessory furnished, indicating construction, sizes, and mounting details.
 - 3. Performance data for each type of plasma device furnished.
 - 4. Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2019 to validate acceptable indoor air quality at the quantity of outside air scheduled (when projects are designed with outside air reduction).
 - 5. Product drawings detailing all physical, electrical and control requirements.
 - 6. Copy of UL 2998 ozone testing and certification.
- B. Operating & Maintenance Data: Submit O&M data.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver in factory fabricated shipping containers. Identify on outside of container type of product and location to be installed. 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 manufacturers' recommendation for storage.

1.7 WARRANTY

- A. Equipment shall be warranted by the manufacturer against defects in material and workmanship for a period of twelve months after shipment. 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 unit furnished and shall be of the manufacturer specified.
- B. Basis of Design: Global Plasma Solutions
- C. All other Suppliers of comparable products requesting prior approval shall:
 - 1. Submit for prior approval in accordance with the requirements of Section 15010.
 - 2. In addition, manufacturers submitting for prior approval for Bi-Polar Ionization must as part of the prior approval request provide their ASHRAE 62.1-2019

Exhibit B - Specification

calculations that prove conformance to the ASHRAE Standard with the reduction of outside air to the scheduled values. A letter on the manufacturer's letterhead requesting prior approval must accompany the request for prior approval stating their calculations are ASHRAE compliant. A third party validation study performed on a previous installation of the same application and product model shall also be included.

2.2 BI-POLAR IONIZATION DESIGN & PERFORMANCE CRITERIA

- A. Each piece of air handling equipment, so designated on the plans, details, equipment schedules and/or specifications shall contain a Plasma Generator with Bi-polar Ionization output as described here within.
- B. The Bi-polar Ionization system shall be capable of:
 - 1. Effectively killing microorganisms downstream of the bi-polar ionization equipment (mold, bacteria, virus, etc.).
 - 2. Controlling gas phase contaminants generated from human occupants, building structure and furnishings.
 - 3. Capable of reducing static space charges.
 - 4. Increasing the interior ion levels, both positive and negative, to a minimum of 1200 ions/cm³ measured 5 feet from the floor.
 - 5. Self-cleaning requiring no maintenance or replacement parts.
 - 6. Producing a minimum of 200M ions/cc.
 - 7. Accepting 24-240VAC or DC voltage without use of a selector switch or external transformer.
 - 8. Capable of controlling and regulating the high voltage output to +/- 5% regardless of voltage input fluctuations.
- C. The bi-polar ionization system shall operate in a manner such that equal amounts of positive and negative ions are produced. Uni-polar ion devices shall not be acceptable.
 - 1. Air exchange rates may vary through the full operating range of a constant volume or VAV system. The quantity of air exchange shall not be increased due to requirements of the air purification system.
 - 2. Velocity Profile: The air purification device shall not have 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 within the air purification system. Air purification system shall be capable of wash down duty.
- E. Equipment Requirements:
 - 1. Electrode Specifications (Bi-polar Ionization):
 - a. Each Plasma Generator with Bi-polar Ionization output shall include the required number of electrodes and power generators sized to the air handling equipment capacity. Bi-polar ionization tubes manufactured of glass and steel mesh shall not be acceptable due to replacement requirements, maintenance, performance output reduction over time, ozone production and corrosion.
 - b. Electrodes shall be energized when the main unit disconnect is turned on and the fan is operating. Electrodes shall be made from carbon fiber to prevent oxidation over time. Internal circuitry shall be provided to sense air flow across the electrode output. Ionization systems requiring the use

Exhibit B - Specification

of a mechanical air pressure switch to cycle the electrodes only when the fan is operating shall not be acceptable due to high failure rates and pressure sensitivity.

- c. Electrode pair shall provide a minimum of 160 million ions per cubic centimeter as measured at 1" inches, both positive and negative ions, in equal quantities. Devices providing less than 160 million ions/cc per electrode pair shall not be acceptable.
- d. Each Plasma Generator shall be provided with a self-cleaning system that is field programmable to change the number of days between the cleaning cycle. Systems without a no-maintenance, self-cleaning system shall not be acceptable.
- e. Each electrode pair shall be designed with a banana style plug such that it can be field replaced if necessary.
- f. Each Plasma Generator shall be provided with an inline on/off switch, universal voltage input (24VAC to 240VAC or DC), magnets for mounting to the fan inlet, replaceable carbon fiber emitters and a programmable self-cleaning system.

F. Air Handler & Plenum Mounted Units (non-ductless mini-split units):

1. Where so indicated on the plans and/or schedules Plasma Generator(s) shall be supplied and installed. The mechanical contractor shall mount the Plasma Generator and wire it to the AHU control power (24VAC) as instructed by the Air Purification Manufacturer's instructions or line voltage subject to power available. Each unit shall be designed with a molded casing, self-cleaning system, self-cleaning test button, power status LED and dry contacts to prove ion output is operating properly. The dry contacts shall close to prove the ion generator is working properly and may be daisy chained in series such that only one dry contact per AHU is required to interface to the BAS. Dry contacts proving power has been applied in lieu of the ion output is actually operating, are not acceptable. Manufacturers providing multiple ion modules that have alarm status wired in parallel, and not in series, shall not be acceptable.

G. Ionization Requirements:

1. Plasma Generators with Bi-polar ionization output shall be capable of controlling gas phase contaminants and shall be provided for all equipment listed above.
 - a. The Bi-polar ionization system shall consist of Bi-Polar Plasma Generator and integral power supply. The Bi-polar system shall be installed where indicated on the plans or specified to be installed. The device shall be capable of being powered by 24VAC to 240VAC without the use of an external transformer. Ionization systems requiring isolation transformers shall not be acceptable.
 - b. Ionization Output: The ionization output shall be controlled such that an equal number of positive and negative ions are produced. Imbalanced levels shall not be acceptable.
 - c. Ionization output from each electrode shall be a minimum of 160 million ions/cc when tested at 1" from the ionization generator.

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- d. All manufacturers shall provide documentation by an independent NELAP 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 - >96% in 30 minutes or less
 - B. E.coli - > 99% in 15 minutes or less
 - C. TB - > 69% in 60 minutes or less
 - D. C. diff - >86% in 30 minutes or lessManufacturers not providing the equivalent space kill rates shall not be acceptable. All manufactures requesting prior approval shall provide to the engineer independent test data from a NELAP accredited independent lab confirming kill rates and time meeting the minimum requirements stated in section 2.2 B, points 6A, 6B and 6C. Products tested only on Petri dishes to prove kill rates shall not be acceptable.
2. Ozone Generation:
 - a. The operation of the electrodes or Bi-polar ionization units shall conform to UL 2998 (less than 5 PPB) with respect to ozone generation. There shall be no ozone generation during any operating condition, with or without airflow.
- J. Electrical Requirements:
3. Wiring, conduit and junction boxes shall be installed within housing plenums in accordance with NEC NFPA 70. Plasma Generator shall accept an electrical service of 24VAC to 240VAC, universal 2 wire input, 1 phase, 50/60 Hz.

The contractor shall coordinate electrical requirements with air purification manufacturer during submittals.
- K. Control Requirements:
4. All Plasma Generators shall have internal short circuit protection, overload protection, and automatic fault reset circuit breakers. Systems with manual fuses shall not be allowed.
 5. Integral airflow sensing shall modulate the Plasma output as the airflow varies or stops. A mechanical airflow switch shall not be acceptable as a means to activate the Plasma device due to high failure rates and possible pressure reversal.
 6. The installing contractor shall mount and wire the Plasma device within the air handling unit specified or as shown on the plans. The contractor shall follow all manufacturer IOM instructions during installation.
 7. All Plasma devices shall have a means to interface with the BAS system. Dry contacts shall be provided to prove there are ions being produced. Systems providing indication that power is applied to the Plasma device, but not directly sensing the power at the ion output, shall not be acceptable.

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).
- B. The Contractor shall have prior experience with large, multi-site installations of GPS ionizers.**

Exhibit B - Specification

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

- A. All equipment shall be assembled and installed in a workman like manner 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 dust and damage on a daily basis throughout construction.
- D. **All equipment shall be tested to ensure VA load does not bring existing transformer voltages too low.**
 - 1. **If VA load is too much for existing transformers, then additional transformers shall be required.**

3.3 TESTING

- A. Provide the manufacturers recommended electrical tests.
- B. **All equipment shall be tested with ion meter to ensure the proper distribution of ions, in each space, after installation.**

3.4 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.

SECTION 15861B-AIR PURIFICATION SYSTEM (iMod – Modular Ion Bar)

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. This section describes the design, performance and installation of an 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 through out. 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 867-2007 including ozone chamber test required as of December 21, 2007
 - 4. UL 2998 Environment – No Ozone Certification
 - 5. The cold plasma equipment and power supply shall be UL listed.
 - 6. The technology shall have been tested to DO-160 by an independent lab and successfully passed all requirements for shock, vibration, EMF and line noise. Manufacturers not tested to DO-160 shall not be acceptable. DO-160 is normally used to test devices in aviation applications, but this standard is applicable to confirm EMF and line noise in HVAC applications.

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1.3 RELATED WORK

- A. Testing, Adjusting and Balancing
- B. Facility Access and Protection
- C. Ductwork
- D. Filters
- E. Water and Refrigerant Piping
- F. Electrical Wiring
- G. Control Wiring

1.4 QUALITY and IP ASSURANCE

- A. Basis of design is Global Plasma Solutions. All other manufacturers requesting prior approval must submit product drawings, specifications and test results specified in section 2.2 at least four weeks prior to bid date.
- B. The Air Purification System shall be a product of an established manufacturer within the USA. Direct Current (DC) Ion modules manufactured outside the USA and assembled in the USA on mounting plates or formed channels shall not be acceptable.
- C. 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.
- D. 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. Any system containing titanium dioxide (TiO₂), which has been listed by the CDC as a known carcinogen, shall not be acceptable.
- E. Projects designed using ASHRAE Standard 62, IAQ Procedure shall require the manufacturer to provide Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2007 to validate acceptable indoor air quality at the quantity of outside air scheduled with the technology submitted. The manufacturer shall provide independent test data on a previous installation performed within the last two years and in a similar application, that proves compliance to ASHRAE 62 and the accuracy of the calculations. The data shall be based on the manufacturer's use of the same make and model number as the equipment submitted on this project.
- F. The Air Purification Technology shall have been tested by UL to prove conformance to UL 867-2007 including the ozone chamber testing and peak ozone test for electronic devices. Manufacturers that achieved UL 867 prior to December 21, 2007 and have not been tested in accordance with the newest UL 867 standard with the ozone amendment shall not be acceptable. All manufacturers requesting prior approval shall submit their independent UL 867 test data with ozone results to the engineer for preliminary review and 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.
- G. The maximum allowable ozone concentration per the UL 867-2007 chamber test shall be 0.001 PPM. The maximum peak ozone concentration per the UL 867-2007 peak test as measured 2 inches away from the electronic air cleaner's output shall be no more than 0.001 PPM. Manufacturers with ozone output exceeding these ozone values shall not be acceptable.

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- H. All manufacturers shall have their product tested to UL 2998 Environmental Standard for confirmation of no ozone with certificate available. The final report shall indicate the ozone levels and high voltage output the device's electrode(s) were operating during the test. Reports that do not include high voltage output during the UL 2998 testing shall not be acceptable.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data for ion generators including:
 - 1. Schedule of plasma generators indicating unit designation, number of each type required for each unit/application.
 - 2. Data sheet for each type of plasma generator, and accessory furnished; indicating construction, sizes, and mounting details.
 - 3. Performance data for each type of plasma device furnished.
 - 4. Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2007 to validate acceptable indoor air quality at the quantity of outside air Scheduled (when projects are designed with outside air reduction).
 - 5. Product drawings detailing all physical, electrical and control requirements.
 - 6. Copy of UL 867 independent ozone test.
 - 7. Copy of UL 2998 conformance certificate.
 - 8. Statement on the manufacturer's letterhead stating that the technology contains no titanium dioxide (TiO₂).
- B. Operating & Maintenance Data: Submit O&M data and recommended spare parts lists.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver in factory fabricated shipping containers. Identify on outside of container type of product and location to be installed. 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 manufacturers' recommendation for storage.

1.7 WARRANTY

- A. Equipment shall be warranted by the manufacturer against defects in material and workmanship for a period of eighteen months after shipment or twelve 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 unit furnished and shall be of the manufacturer specified.
- B. Basis of Design: Global Plasma Solutions
- C. All other Suppliers of comparable products requesting prior approval shall:
 - 1. Submit for prior approval four weeks in advance in accordance with the requirements of Section 15010.
 - 2. In addition, manufacturers submitting for prior approval for Bi-Polar Ionization must as part of the prior approval request provide their ASHRAE 62.1-2007

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calculations that prove conformance to the ASHRAE Standard with the reduction of outside air to the scheduled values. A letter on the manufacturer's letterhead requesting prior approval must accompany the request for prior approval stating their calculations are ASHRAE compliant. A third party validation study performed on a previous installation of the same application using the same make and model equipment shall also be included.

3. Submit independent test data from UL showing ozone levels produced during the UL 867 ozone chamber test. Manufacturers without this test data shall not be acceptable.
4. Submit UL 2998 Environmental Claim Certificate proving no ozone output.
5. Submit pathogen testing per section 2.2.
6. Submit at least two other end user references in the same application with contact phone number, email, equipment used and application for the equipment at that facility. Manufacturers not having the above references in similar applications using the same equipment models as proposed on the current project shall not be acceptable.
7. Ionization bars manufactured using DC output ionization modules shall not be permitted due to corrosion, ion short-circuiting, and intermittent coil coverage and shock hazard.
8. Ionization bars manufactured using ion modules not having epoxy coating all circuit boards and internal components shall not be acceptable.
9. Manufacturers submitting as an alternate shall include their DO-160 test results.
10. It is the responsibility of any alternate manufacturer and mechanical contractor proposing an alternate to the basis of design to confirm any proposed substituted product does not infringe on the intellectual property of the basis of design. The engineer and owner recognize the basis of design holds multiple patents and multiple patents are pending.

2.2 BI-POLAR IONIZATION DESIGN & PERFORMANCE CRITERIA

- A. Each piece of air handling equipment, so designated on the plans, details, equipment schedules and/or specifications shall contain a Plasma Generator with Bi-polar Ionization output as described here within.
- B. The Bi-polar Ionization system shall be capable of:
 1. Effectively killing microorganisms downstream of the bi-polar ionization equipment (mold, bacteria, virus, etc.).
 2. Controlling gas phase contaminants generated from human occupants, building structure, furnishings and outside air contaminants.
 3. Capable of reducing static space charges.
 4. Effectively 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 - >96% in 30 minutes or less
 - B. E.coli - > 99% in 15 minutes or less
 - C. TB - > 69% in 60 minutes or less
 - D. C. diff - >86% in 30 minutes or less

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- E. Noro Virus -> 93.5% in 30 minutes or less
- F. Legionella -> 99.7% in 30 minutes or less

Manufacturers not providing the equivalent space kill rates shall not be acceptable. All manufactures requesting prior approval shall provide to the engineer independent test data from a NELAC accredited independent lab confirming kill rates and time meeting the minimum requirements stated in section 2.2 B, points 6A, 6B and 6C. Products tested only on Petri dishes to prove kill rates shall not be acceptable. Products being sold under different trade names than those tested shall not be acceptable.

- 7. Capable of modular field assembly in six inch (150mm) sections.
- C. The bi-polar ionization system shall operate in a manner such that equal amounts of positive and negative ions are produced. Uni-polar ion devices shall not be acceptable. Ionizers with positive and negative output (DC type) shall not be acceptable. All ionizers provided shall be AC type ionizers with one electrode pulsing between positive and negative.
- 1. Air exchange rates may vary through the full operating range of a constant Volume or VAV system. The quantity of air exchange shall not be increased due to requirements of the air purification system.
 - 2. Velocity Profile: The air purification device shall not have 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 within the air purification system. Air purification system shall be capable of wash down duty.
- E. Equipment Requirements:
- 1. Electrode Specifications (Bi-polar Ionization):
 - a. Each alternating current (AC) Ionization Bar with Bi-polar Ionization output shall include a minimum of eighteen carbon fiber cluster ion needles per foot of coil face width shall be provided. The entire cooling coil width shall have equal distribution of ionization across the face. Systems without ion needles at least 0.50" (12.5mm) apart shall not be acceptable. The plasma electrode shall require no more than 1.0" (25mm) in the direction of airflow for mounting. All hardware required for mounting shall be provided by the air purification manufacturer except self-tapping screws for the power supply. Bi-polar ionization tubes manufactured of glass and steel mesh shall not be acceptable due to replacement requirements, maintenance, and performance output reduction over time, ozone production and corrosion.
 - b. Electrodes shall be provided in 6.0" (150mm) increments, epoxy filled for an IP55 rating and utilizing brass connection hardware that is recessed into the connection joint once fully engaged and assembled.
 - c. Electrodes shall be energized when the main unit disconnect is turned on.
 - d. The ionization output shall be a minimum of 60 million ions/cc per inch of cooling coil width as measured 1 inch from the cold plasma needles.
 - e. Ionization bars shall be provided with magnet mounting kits to prevent penetration into cooling coils.
 - f. Ionization bars shall be constructed of UL 94VO and UL746C composite material.

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F. Air Handler Mounted Units:

1. Where so indicated on the plans and/or schedules Plasma Generator(s) shall be supplied and installed. The mechanical contractor shall mount the Plasma Generator and wire it to the remote mount power supply using the cables provided by the air purification manufacturer. A 24VAC, 115VAC or 208-230VAC circuit shall be provided to the plasma generator power supply panel. No more than 15 watts shall be required per power supply. Each power supply shall be capable of powering up to 6 ionization bars or a total of 100 linear feet of bar. Each plasma generator shall be designed with powder coated metal casing, liquid tight flexible conduit and a high voltage quick connector.
2. Where the ionization bars are mounted downstream of steam humidifiers, the air handler manufacturer shall provide an angled hat section that will cover the ionization bars and deflect any direct condensation towards the floor and off the bars.

G. Plasma Requirements:

3. Plasma Generators with Bi-polar ionization output shall be capable of controlling gas phase contaminants and shall be provided for all equipment listed above.
 - a. The Bi-polar ionization system shall consist of Bi-Polar Plasma Generator and power supply. The Bi-polar system shall be installed where indicated on the plans or specified to be installed. The device shall be capable of being powered by 24VAC, 115VAC or 208-230VAC without the use of an external transformer. Ionization systems requiring isolation transformers shall not be acceptable.
 - b. Ionization Output: The ionization output shall be controlled such that an equal number of positive and negative ions are produced (AC Ionizers only are acceptable). Imbalanced levels shall not be acceptable.
 - c. Ionization output from each bar shall be a minimum of 60 million ions/cc per inch of bar when tested at 1" from the ionization bar. Bars with needles spaced further apart than 0.5" shall not be acceptable.
 - d. Each plasma electrode shall be made from an all composite, UL 94V0 and UL 746C rated material for prevention of corrosion and electrical insulation.
4. Ozone Generation:
 - a. The operation of the electrodes or Bi-polar ionization units shall conform to UL 2998 as tested by UL proving no ozone output.

H. Electrical Requirements:

5. Wiring, conduit and junction boxes shall be installed within housing plenums in accordance with NEC NFPA 70. Plasma Generator shall accept an electrical service of 24VAC, 115 VAC or 208-230VAC, 1 phase, 50/60 Hz. The contractor shall coordinate electrical requirements with air purification manufacturer during submittals.

I. Control Requirements:

6. All Plasma Generators shall have internal short circuit protection, overload protection, and automatic fault reset. Systems requiring fuses shall not be acceptable.
7. The Plasma Generator power supply shall have internal circuitry to sense the ionization output and provide dry contact alarm status to the BMS as well as a local "Plasma On" indication light.

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8. If scheduled, the ionization system shall be provided with a stand-alone, independent ion sensor designed for duct mounting to the ionization bar to monitor the ion output and report to the BAS system that the ion device is working properly. Ion systems provided without an independent ion sensor, shall not be permitted. The control voltage to power the ion sensor shall be 24VAC to 260VAC and draw no more than 150mA of current. The sensor shall provide at minimum, dry contact status to the BAS and optionally a BacNet or Lonworks interface as specified on the control drawings. If scheduled, manufacturers not providing a stand-alone ion sensor shall not be acceptable.
9. The installing contractor shall mount and wire the Plasma device within the air handling unit specified or as shown on the plans. The contractor shall follow all manufacturer IOM instructions during installation.
10. An optional fiberglass NEMA 4X panel with Plasma On/Off Indicator Light (interfaced with stand-alone ionization detector), Ionization Output On/Off Indicator Light and an On/Off Illuminated Switch shall be provided to house the power supply, if noted on the schedule.

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).
- B. The Contractor shall have prior experience with large, multi-site installations of GPS ionizers.**

3.2 ASSEMBLY & ERECTION: PLASMA GENERATOR

- A. All equipment shall be assembled and installed in a workman like manner 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 dust and damage on a daily basis throughout construction.
- D. All equipment shall be tested to ensure VA load does not bring existing transformer voltages too low.
1. If VA load is too much for existing transformers, then additional transformers shall be required.**

3.3 TESTING

- A. Provide the manufacturers recommended electrical tests.
- B. All equipment shall be tested with ion meter to ensure the proper distribution of ions, in each space, after installation.**

3.4 COMMISSIONING & TRAINING

Exhibit B - Specification

- 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