Performance Report - CDIFF

GPS NPBI

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OVERVIEW

Through our patented technology, needlepoint bipolar ionization, also known as NPBI™, our products clean indoor air by reducing airborne particulates, odors and pathogens — all while saving you energy consumption and lowering your carbon footprint. GPS delivers cleaner indoor air without producing ozone or other harmful byproducts. GPS is proud to lead the market by being the safe, effective choice for ionization and we have the results to prove it.

PERFORMANCE VALIDATION

GPS has long been a leader in the indoor air quality systems market, providing technology that is based on reliable science and an unwavering obligation to the safety of our customers and communities. We realize that a testing approach is as important as the results themselves and live this philosophy with robust testing methodologies and capabilities.

SENSITIVITY TESTING

A petri dish containing a pathogen is placed underneath a laboratory hood, then monitored to assess the pathogen's reactivity to NPBI over time. This controlled environment allows for comparison across different types of pathogens. Sensitivity Testing is not a measure of pathogen inactivation in the air.

SIMULATION TESTING

Simulation testing measures in-air inactivation of pathogens. Counts of an airborne pathogen are taken before and after aerosolizing that pathogen into a sealed, unoccupied laboratory environmental room installed with NPBI technology.

SPECIALTY TESTING

Unoccupied laboratory test environments are designed to evaluate NPBI performance in conditions unique to particular industries or customers, and may include special circumstances such as higher than average ion concentrations. Review individual test results for details.

FIELD TESTING

Unoccupied laboratory test environments are designed to evaluate NPBI performance in conditions unique to particular industries or customers, and may include special circumstances such as higher than average ion concentrations.

DISCLAIMER: Global Plasma Solutions (GPS) uses multiple data points to formulate performance validation statements. GPS technology is used in a wide range of applications across diverse environmental conditions. Since locations will vary, clients should evaluate their individual application and environmental conditions when making an assessment regarding the technology's potential benefits.

The use of this technology is not intended to take the place of reasonable precautions to prevent the transmission of pathogens. It is important to comply with all applicable public health laws and guidelines issued by federal, state, and local governments and health authorities as well as official guidance published by the Centers for Disease Control and Prevention (CDC), including but not limited to social distancing, hand hygiene, cough etiquette, and the use of face masks.

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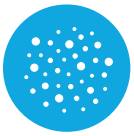
Benefits of GPS

TECHNOLOGY

A PROVEN PROCESS TO CLEAN THE AIR

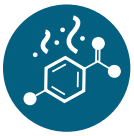


TARGETS PARTICLES

When these ions disperse throughout a space, such as an office or a schoolroom, they combine with particles suspended in the air. This creates a snowball effect in which particles of opposite polarities begin to cluster together, making them easier to capture in filtration systems.

REDUCES PATHOGENS

During the NPBI process, contact with ions disrupts pathogens' surface proteins, rendering them inactive and unable to replicate.



TACKLES ODORS

GPS' NPBI technology breaks down chemical, pet, cooking and other odors into basic harmless compounds, leaving indoor air smelling fresh and substantially reducing odor-causing VOCs.

SAVES ENERGY

By keeping indoor air cleaner, NPBI reduces the amount of air required from outside to keep things fresh — saving you initial ventilation equipment costs and up to 30% on energy consumption.

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Performance Reports
Q & A

We've compiled the following Q&A's to help improve understanding of our technology and its impact on air purification. To learn more, visit the GPS webpage on reducing airborne viruses.

Does this technology eliminate airborne pathogens entirely?
No, there is no way to guarantee ions will reach every virus or bacteria particle in the room. Viruses and bacteria that do not come into contact with ions will continue to be infectious and capable of spreading disease.

How does GPS protect people from pathogens?
GPS technology is not a medical device and is not marketed for disease prevention in people. Instead, GPS's NPBI is an air cleaning system intended to reduce the volume of infectious pathogens by inactivating them and improving the efficiency of filtration solutions.

Does the use of NPBI mitigate the need for social distancing, masks, etc.?
No, the use of this technology is not intended to take the place of reasonable precautions to prevent the transmission of pathogens. It is important to comply with all applicable public health laws and guidelines issued by federal, state and local governments and health authorities as well as official guidance published by the Centers for Disease Control and Prevention (CDC). This includes but is not limited to social distancing, hand hygiene, cough etiquette and the use of face masks.

How does GPS support performance statements regarding pathogens?
We engage independent laboratories to execute performance validation experiments.
COVID-19 has changed the way the world views indoor air quality. GPS is committed to leading through independent laboratory pathogen testing. GPS was the first in the industry to test our products against SARS-CoV-2 (COVID-19). GPS will continue to lead throughout the COVID-19 pandemic and beyond.

Does GPS create ozone? (Historically, ionization technology has been known to produce ozone.)
No, GPS is the safe and effective solution for air ionization. GPS offers UL 2998 certified products, which is the ASHRAE qualification standard for zero ozone emissions.

How does GPS differ from the rest of the air purification industry?
Not only does GPS improve indoor air quality without producing ozone or other harmful byproducts, but it is also the only auto-cleaning air purification system that ensures optimal long-term performance. Unlike alternative technologies, GPS' NPBI requires no replacement parts or future maintenance.

Please refer to the FAQ section of our site for additional details.
Please reach out to your GPS representative for additional information if needed.

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FINAL REPORT

Efficacy of a Bipolar Ionization System

ORDER Number
371208933

PREPARED FOR:

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Certificate of Analysis

Client: Global Plasma Solutions

Contact: Charles Waddell
Project: Bipolar Ionization System

Product : GPS-IBAR-36
EMSL NO: 371208933

Sample received: 6/11/2011
Start date: 6/18/2011
Report date: 6/26/2011
Challenge Bacteria: *Clostridium difficile* ATCC 70057

Experimental Summary: The testing procedure was designed after discussions between EMSL Analytical, the testing company, and the client, Global Plasma Solutions. The testing was conducted on the GPS-IBAR-36 for its ability to disinfect (kill) bacteria on a solid surface. The testing was conducted in our Cinnaminson Microbiology Laboratory.

Procedure:

Bacteria

Clostridium difficile (*C. difficile*) was innoculated on Tryptic Soy agar + 5% sheep blood (TSAB) and incubated at 35°C for 48 h under anaerobic conditions. A single isolated colony was then taken and innoculated into Reinforced Clostridium Medium (RCM) and incubated at 35°C for 24 h under anaerobic conditions. This solution was then washed three times with Phosphate buffer at 3,000 x g for 10 min. This solution was then used to inoculate the test carrier.

Inoculation of the Test Carrier

Two sterile Petri dishes were labeled as follows: Control and 30 minutes. Two carriers were then placed into each respective Petri dish. 100µL of the bacterial solution was then placed into the middle of the carrier and spread evenly. This was repeated in triplicate for each time point and the control(a total of 6 slides). The Petri dish containing the inoculated carriers was then allowed to dry for 4 hours in a biological hood.

Efficacy Testing

The GPS-IBAR-36, a bipolar ionization system, was first set up facing down with 5 cm of clearance from the surface. The test carriers in their respective Petri dishes were then placed under the GPS-IBAR-36 and system was turned on.

The control was not exposed to the ionizer and instead placed directly into 10 mL of PBS. After 30 minutes the 30 min Petri dish was removed and the three carriers placed into 10 mL of PBS.
Serial dilutions were then created for each carrier by taking 1mL out and placing it into 9 mL of PBS. For each dilution 100µL was plated onto a TSAB plate.
The inoculated plates were then incubated in anaerobic conditions at 37°C for 48 – 72 h. The colonies were counted and recorded.

Experimental Results:

Table 1: Reduction of *C. difficile*

***C. difficile* Control**			***C. difficile* Test**	
Time (min)	**Avg CFU**	**Log10**	**LR**	**%Reduction**
Control	$1.07x10^4$	4.03		
30	$1.40x10^3$	3.15	0.88	86.87%

Log Reduction and %Reduction compares initial CFU and specified CFU
A negative LR or %Reduction is the result of an increase in cells.

Conclusions/Observations:

The efficacy of the GPS-IBAR-36, a bipolar ionization system, to disinfect a solid surface against *C. difficile* was tested. It was observed that the Log Reduction was 0.88 for 30 min, refer to Table 1.
In conclusion, the GPS-IBAR-36 demonstrated the ability to disinfect *C. difficile* on a solid surface with an observed percent reduction of 86.87% in 30 minutes.

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Jason Dobranic, Ph.D.
National Director of Microbiology