



THE SCIENCE OF CLEANER, SAFER AIR

GPS's Unique Needlepoint Bipolar Ionization Technology Is Safe and Effective

GPS is the world's leading provider of advanced Needlepoint Bipolar Ionization (NPBI™) technology, which has dramatically strengthened how hospitals, schools and thousands of sensitive, high-use locations improve indoor air quality. As a complement to air filtration and modern HVAC installations, GPS's cutting-edge systems can create an environment that enables the neutralization of harmful pathogens without introducing elevated levels of ozone, carbon dioxide, volatile organic compounds (VOCs) or other dangerous compounds.

Independent Testing Shows that GPS Technology Is Highly Effective at Neutralizing SARS-CoV-2 and Other Pathogens

GPS's NPBI technology is unique – and it works. In new surface tests conducted in March by independent laboratory Innovative Bioanalysis, GPS's NPBI technology created an environment that enabled the **surface neutralization of up to 98.5% of SARS-CoV-2 pathogens in 30 minutes and up to 99.9% of SARS-CoV-2 pathogens in 60 minutes.** In tests of NPBI technology against **aerosolized SARS-CoV-2**, GPS's products were found to be similarly effective. These tests also showed that systems with GPS's NPBI technology neutralized harmful pathogens **nearly 3X faster** than in environments that lacked ionization technology.

Independent, Real World Testing Shows that GPS Technology Is Safe and Effective

Rigorous, independent, modern lab tests and measurements on real-world installations demonstrate that GPS's NPBI technology – unlike other ionization systems – does not increase ozone, carbon dioxide, VOCs, nitrogen dioxide or fine particles. Recent independent testing by Intertek Laboratories confirmed that GPS's NPBI technology does not increase VOCs. All of our independent and real-world testing show that, when installed and operated correctly, GPS systems significantly reduce the amount of harmful pollutants in the air to levels much lower than typically found in outside air in many areas. After being installed at a hospital in Houston, recorded levels of VOCs were reduced by approximately two thirds. After first being installed by Cone Health at Wesley Long Hospital in Greensboro, NC, GPS systems were found to be effective almost immediately and have been applied to all of the hospital's air handling units (AHU) installed since, including the AHUs that service the operating rooms and the newly installed AHUs at the facility where they treat their COVID-19 patients.

GPS Is the Only Brand to Earn UL's Stringent Zero Emissions Certification for All of Its Products

GPS is the only clean air technology brand to earn the UL 2998 "zero ozone" certification across its entire product line. This certification meets the UL qualification standard for ozone-free emissions and is compliant with ASHRAE standards. In addition, NPBI is the only technology provider in its category to pass the RTCA DO-160 standard for aircraft.



GPS's Air Cleaning Technology Is Used in Thousands of the Most Sensitive, Closely Monitored Locations

GPS technology is installed and trusted to help clean the air in more than 250,000 locations around the world. These include highly sensitive, high traffic and carefully monitored environments, including: schools and universities, hospitals, airports, banks, professional sports arenas and stadiums, office buildings and research facilities, many of which test their indoor air quality on a regular basis to ensure compliance with strict standards for health and safety.





Clearing the Air: The Facts about Recent Studies on Bipolar Ionization

GPS appreciates academics, engineers and other experts testing its NPBI clean air technology. As they do so, it is important to ensure that researchers are accurately replicating real world applications of the products and ion delivery systems (HVAC). Researchers should also not borrow standards from other testing methods that are not applicable for NPBI's class of technology. While the science behind NPBI stretches back more than a century, GPS has pushed this technology forward into exciting, safe and effective, and important new directions! A recent report¹ - which was based on testing methodologies that were not applicable or incomplete - have raised some questions. Even the researchers admitted that their experiment design was not robust, saying, "this work is not without limitations and future direction is needed." We want you to have the facts.

THE TEST CHAMBER WAS NOT REPRESENTATIVE OF REAL-WORLD CONDITIONS

The chamber in the description appears to be an airtight refrigeration enclosure. It is impossible to know from the test description if the chamber was vented. In a real world environment, air is able to flow in and out of a space. But if the test chamber did not have an exhaust vent, the ions produced by the NPBI technology would not have flowed into the chamber effectively, as the chamber would have become pressurized after a few seconds, limiting airflow. With proper airflow, the NPBI device produces a constant flow of ions into the space at a level that independent testing clearly documents control of pathogens, particles and volatile organic compounds (VOCs).

THE TEST FAILED TO OPERATE THE DEVICE AS RECOMMENDED BY GPS

Ionization is proven to be most effective, especially for particles, when the conditioned air is pushed at a certain velocity and then recirculated back to the ionization source multiple times to pass through the air filter, as is typical in most HVAC installations. This facilitates proper ion production and the agglomeration process (the process of increasing the size of particles as they bond to the ions), which aids HVAC filters in capturing the now larger particles. In this test, the air did not reach the recommended velocity and only passed through a filter once. As tested at independent laboratories Blue Heaven Technologies, GPS has demonstrated that ionization in addition to a MERV 8 filter is as efficient as a MERV 13 filter without ionization, leading to safe, efficient and cost-effective air quality improvement for over 250,000 locations around the world. In fact, many clean rooms use this technology to improve even HEPA filter particle capture.

A LOW CONCENTRATION OF IONS UNDERCUT EFFECTIVENESS

The ionizer used in the test was set to increase the amount of ions inside the test chamber to a level that was lower than the recommended guidance for achieving effective results. In addition, the researchers only measured the level of ions inside the test chamber "prior to testing," so there is no way to know what levels of ions were maintained throughout the test.

FAILURE TO REPLICATE THE TEST VIOLATED PROPER TEST DESIGN

Each test on the NPBI technology was only conducted once. The long established standards for proper experimental design call for tests to be performed at least three times to validate results.

THE TEST PROVIDED INSUFFICIENT IONIZATION TIME

GPS systems should be operated 24 hours, 7 days per week to allow the generated ions to agglomerate particles and return them to the filter. The ionizer used in the research was turned on only 3.5 hours prior to testing

THE TEST FAILED TO DEMONSTRATE THE SOURCE OF VOCs

The report appears to show an increase in some VOCs that the authors intimate is a result of ionization. However, the report goes on to state "We were unable to discern the relative contribution of the ionizer-initiated chemistry vs. indoor sources," raising serious questions about the original source of the VOCs and whether they came from the ionization device at all. In fact, recent independent testing by Intertek Laboratories confirmed that GPS's NPBI technology does not increase VOCs.

1) Yicheng Zeng et al, Evaluating a commercially available in-duct bipolar ionization device for pollutant removal and potential byproduct formation, *Building and Environment* (2021), DOI: [10.1016/j.buildenv.2021.107750](https://doi.org/10.1016/j.buildenv.2021.107750)



Despite the research's deficiencies, it does demonstrate certain efficacy and safety features of NPBI that is consistent with GPS's own independent research:

 **NPBI PRODUCES NO OZONE OR OTHER HARMFUL BYPRODUCTS**

The report verified that the GPS NPBI technology did not produce ozone, nitrogen dioxide emissions or fine particulate matter when producing ions for cleaner air.

 **IONIZATION DOES LEAD TO PARTICLE AGGLOMERATION**

The study confirmed that the ions produced by the ionizer technology contributed to making fine particles larger and heavier and, therefore, easier to filter and remove. This validates a central aspect of ionizing air cleaning technology.