



## Laboratory Research Summary Plasma Air Products



Dozens of independent laboratory tests have shown Plasma Air HVAC devices safely and effectively reduce bacteria, viruses, allergens, volatile organic compounds, and particulate matter.

## Influenza A Reduction

Laboratory Name: **Kitasato Research Center for Environmental Science**  
Laboratory Location: **Kanagawa, Japan**  
Date: **September 27, 2011**  
Device Tested: **D5 needlepoint ionizer cartridge, used in the 7000 Series and the Plasma BAR**  
Space Treated: **0.2 m<sup>3</sup>**

### Objective

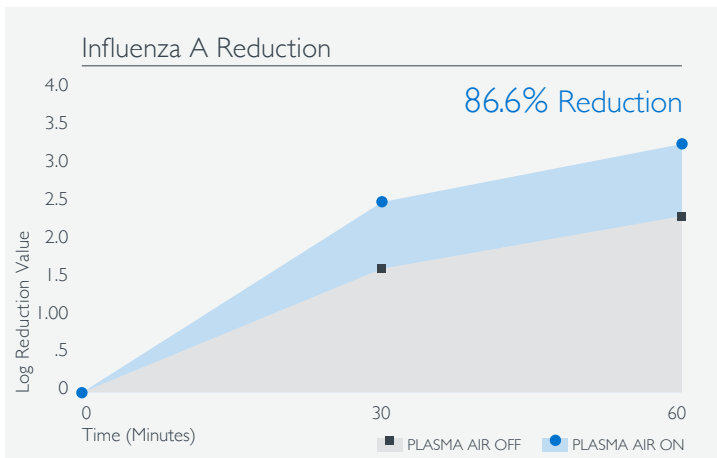
To evaluate the efficacy of the 7000 series and the Plasma BAR in reducing Influenza A (H1N1) virus.

### Methodology

The 0.2 m<sup>3</sup> acrylic test chamber was put into a biological safety cabinet. The D5 device and fan were then placed in the test chamber. The virus suspensions were sprayed into the chamber using a compressor-type nebulizer NE-CI6 (OMRON) into the test chamber for 5 minutes at an air flow ratio of approximately 0.2 mL/min.

### Summary of Results

The device reduced 86.6% of Influenza A virus after one hour.



# Airborne Bacteria and Bacteria Spore Reduction

Laboratory Name:	Istanbul Faculty of Medicine, Department of Microbiology and Clinical Microbiology
Laboratory Location:	Istanbul, Turkey
Date:	January 20, 2011
Device Tested:	D5 needlepoint ionizer cartridge, used in the 7000 Series and the Plasma BAR
Space Treated:	1 m <sup>3</sup>

## Objective

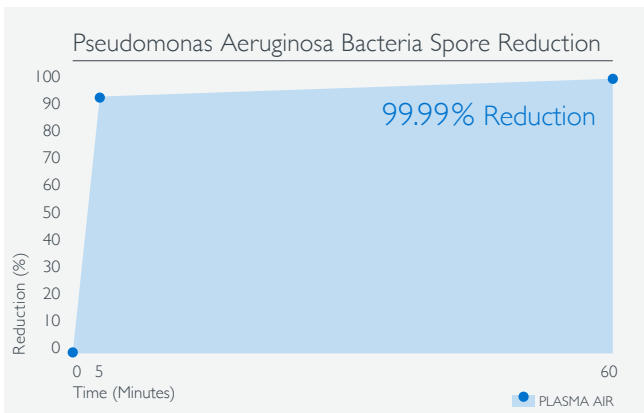
To evaluate the efficacy of the 7000 series and the Plasma BAR on reducing *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, and *Bacillus subtilis var. niger*.

## Methodology

A 1 m<sup>3</sup> volumetric isolated test chamber was used for testing. One HVAC device was placed on the floor of the chamber. Airborne bacterial counts were measured before turning on the HVAC device.

## Summary of Results

After one hour, testing showed 91.50% reduction of *Staphylococcus aureus*, 99.99% (no growth) reduction of *Pseudomonas aeruginosa*, 91.15% reduction *Escherichia coli*, and 89.30% reduction of *Bacillus subtilis var. niger*.



# Staphylococcus epidermidis Bacteria Reduction

Laboratory Name: **Aerosol Research and Engineering Laboratories**  
 Laboratory Location: **Olathe, Kansas**  
 Date: **November 22, 2016**  
 Device Tested: **PA101D, PA201D**  
 Space Treated: **563 ft<sup>3</sup>**

## Objective

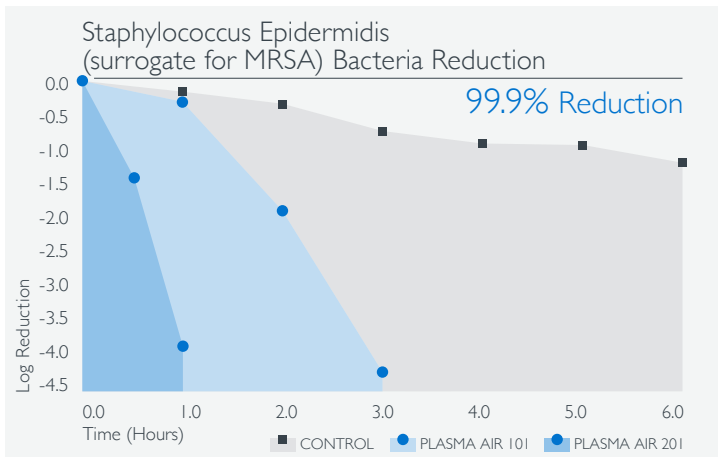
To evaluate the efficacy of the PA101D and PA201D on neutralizing airborne bacteria. The device was tested against aerosolized *Staphylococcus epidermidis*, a surrogate for methicillin-resistant *Staphylococcus aureus* (MRSA) bacteria.

## Methodology

A large sealed aerosol test chamber was used to replicate a potentially contaminated room environment.

## Summary of Results

The 101D achieved a 3.4 net log reduction and the 201D achieved a 3.5 net log reduction of *Staphylococcus epidermidis* (surrogate for MRSA) bacteria in 3 hours.



# Airborne Bacteria, Mold and Yeast Reduction

Laboratory Name: EMSL Analytical, Inc.  
Laboratory Location: Cinnaminson, NJ  
Date: February 28, 2011  
Device Tested: D5 needlepoint ionizer cartridge, used in the 7000 Series and the Plasma BAR.

## Objective

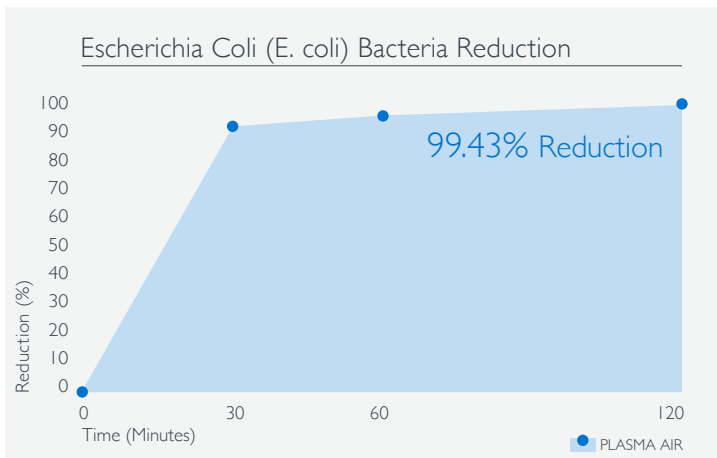
To evaluate the efficacy of the 7000 series and the Plasma BAR in reducing airborne bacteria: *Escherichia coli* and *Staphylococcus aureus*, mold: *Aspergillus niger* and *Cladosporium cladosporioides*, and yeast *Candida albicans*.

## Methodology

An environmental chamber was set up for the testing. A nebulizer was connected to an air compressor with 1/4-inch plastic tubing and to the environmental test chamber through one of the openings.

## Summary of Results

Testing showed a 99.43% reduction of *Escherichia coli*, an 81.67% reduction of *Staphylococcus aureus*, a 97.14% reduction of *Aspergillus niger*, a 97.69% reduction of *Candida albicans* and 36.27% reduction of *Cladosporium cladosporioides*.



# VOC, Bacteria, and Smoke Particulate Reduction

Laboratory Name: **LAWN Environmental Protection Ltd.**  
 Laboratory Location: **Hong Kong, China**  
 Date: **November 27, 2008**  
 Device Tested: **PAI02C**  
 Space Treated: **1000 ft<sup>3</sup>**

## Objective

To evaluate the efficacy of the PAI02C on reducing total volatile organic compounds (TVOC), formaldehyde (HCHO), airborne bacteria and cigarette smoke particulate.

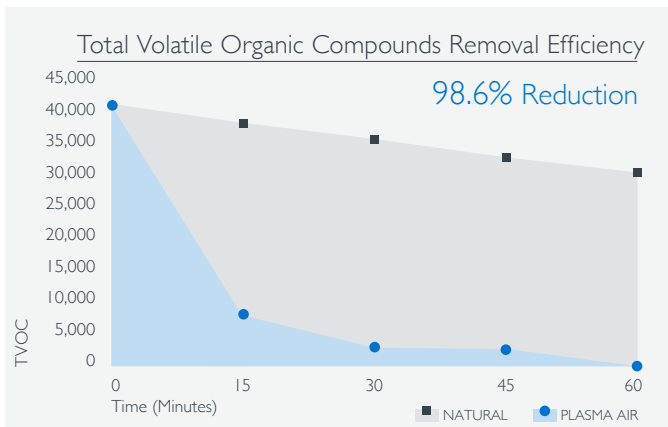
## Methodology

The testing of the PAI02C took place in a controlled room 1,000 ft<sup>3</sup> in size.

## Summary of Results

The device reduced over 70% of TVOC, formaldehyde, airborne bacteria and cigarette smoke particulate (0.5μ – 5.0μ) within 15 minutes, over 80% within 30 minutes, and over 90% within 45 minutes.

Final results after one hour: 95.3% reduction of formaldehyde, 98.6% reduction of TVOC, 95.3% reduction of airborne bacteria, and 96.3% reduction of particulate.



# Dust Particle and *Aspergillus fumigatus* Mold Spore Reduction

Laboratory Name: **Intertek**  
 Laboratory Location: **Cortland, NY**  
 Date: **January 26, 2005**  
 Device Tested: **PAI01C**  
 Space Treated: **1000 ft<sup>3</sup>**

## Objective

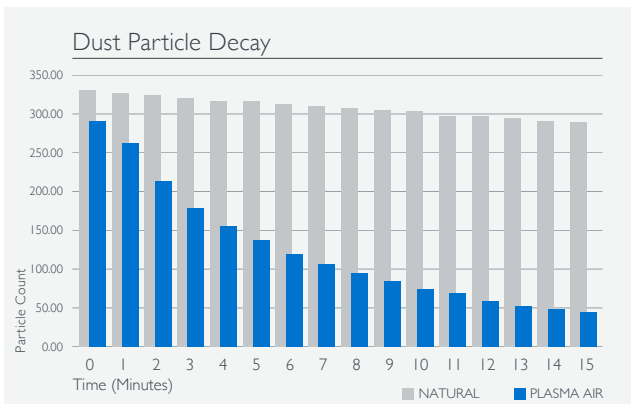
To evaluate the efficacy of the PAI01C on reducing airborne dust particles and *Aspergillus fumigatus* mold spores.

## Methodology

The tests were conducted in a closed room 10.5 × 12 × 8 ft equipped with an exhaust system to clean the room between tests. The room also had a ceiling fan to evenly spread the contaminants injected into the room. The PAI01C was installed in a duct system which supplied a measured amount of purified air into the room.

## Summary of Results

Over the fifteen-minute test period, the dust particles decayed naturally by 12.6%, while the PAI01C produced a decay rate of 85.8%. The *Aspergillus fumigatus* mold spores decayed naturally at a rate of 67.1%, while the PAI01C produced a decay rate of 91.1%.



# Dust Particle Reduction Against Competitive Products

Laboratory Name: **Intertek**  
 Laboratory Location: **Cortland, NY**  
 Date: **November 1, 2005**  
 Device Tested: **PAI01C**  
 Space Treated: **1000 ft<sup>3</sup>**

## Objective

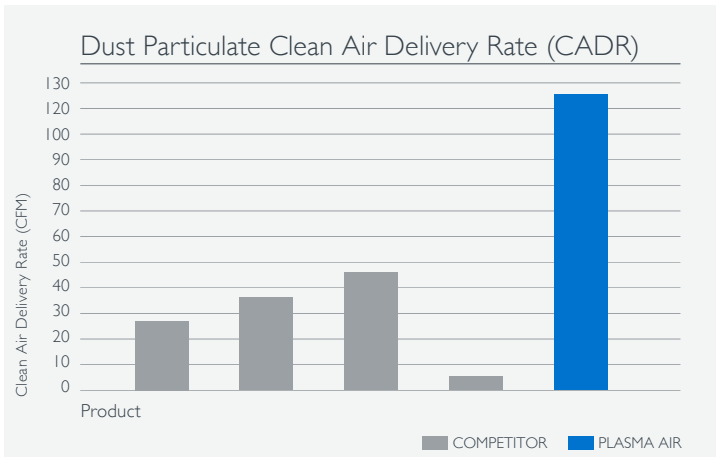
To evaluate the efficacy of the PAI01C on reducing airborne dust particles against other competitive products on the market.

## Methodology

The tests were conducted in a closed room 10.5 × 12 × 8 ft equipped with an exhaust system to clean the room between tests. The room also had a ceiling fan to evenly spread the contaminants injected into the room. The PAI01C was installed in a duct system which supplied a measured amount of purified air into the room.

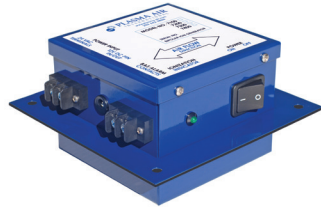
## Summary of Results

The PAI01C had the highest Clean Air Delivery Rate (CADR) among the five devices that were tested of 125.0 CFM.

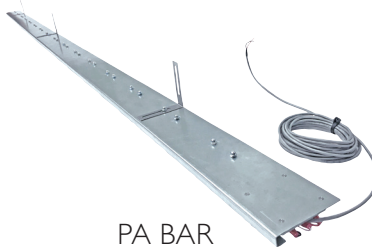




PA 100/200 Series



PA 7000 Series



PA BAR