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# We take testing very seriously

AtmosAir Real Test Data

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# Dr. Philip Tierno, Jr.

## Professor of Microbiology and Pathology New York University School of Medicine

NYU School of Medicine Professor Philip Tierno Jr., 'Dr. Germ,' Completes Paper on AtmosAir Technology

April 22, 2017 / in AtmosAir in The News / by Administer



Dr. Philip M. Tierno Jr., Professor of Microbiology & Pathology at New York University and NYU Langone Medical Center reviewed published research and testing on AtmosAir purification technology and concluded in his recent paper:

*"There is only one technology that satisfies all of the tenants for providing clean indoor air quality for an entire building, which uses low energy, is effective against bacteria, viruses, and mold fungi (whether in air or on surfaces), neutralizes particulates, breaks down VOCs (Volatile Organic Compounds), eliminates unpleasant odors, eliminates static electricity, and produces no chemical or harmful by-products (including NO ozone production) and this is accomplished by the production of positive and negative ions (bipolar ionization). That system is AtmosAir Bipolar Ionization."*

[Read the full paper - HERE.](#)

### About the author

Dr. Tierno is Professor of Microbiology and Pathology at NYU School of Medicine and NYU Langone Medical Center. He also serves on the Global Hygiene Council. Dr. Tierno is the author of the book, *The Secret Life of Germs*, and has authored or co-authored several other publications. Dr. Tierno has served on the New York City Mayor's Task Force on Bio Terrorism.

Dr. Tierno, Jr: 23 March 2020

"AtmosAir Bipolar Ionization causes production of clusters of bi-polar ions and hydroxyl radicals which attach to the surface of microbes removing hydrogen from the microbe's cell wall, thereby killing them. It can reduce 99.99% of microbes in a matter of minutes. Ions work in a continuous fashion to disinfect the air."

"Since the virus is spread via direct and indirect contact, the **continuous application** of Bi-Polar Ions emitted to ambient air by the AtmosAir System continuously disinfect both the breathing space and surfaces. It is the most effective system for continuously cleaning and decontaminating indoor air.

As mentioned above, the possibility of aerosolized spread of COVID-19 and the ability of particles to hang in the air for extended periods of time, would make the consideration of an active air cleaning strategy even more prudent.

Also, because Coronaviruses are enveloped viruses, they are easier to kill compared to naked viruses like Noroviruses. AtmosAir has shown significant reduction of bacteria and viruses in both laboratory and in situ testing. Spaces like airport terminals where travelers from affected regions may carry and spread this virus could implement the AtmosAir bipolar ionization air cleaning system as a step to combat the spread of illness."

# AtmosAir vs. Coronavirus on Surfaces

## 99.9% Reduction in 30 minutes



**Study Title:** Virucidal Efficacy of a Test Substance for use on Inanimate Nonporous Surfaces

**Test Microorganism:** Human Coronavirus, Strain 229E, ATCC VR-740

**Standardized Test Method:** ASTM E1053 Method

**Result: 99.92% Reduction in 30 minutes**

### Test Parameters

- Test Substance Application: Fogging
- Contact Time: 30 Minutes
- Procedure Summary:

Sterile petri dish carriers were inoculated with a volume of virus suspension. The inoculated test carriers were dried at room temperature under laminar flow conditions. The control carrier was held covered for the 30 minute contact time, then harvested in the same manner as the test carriers. The output ionization of the AtmosAir SGMH-882 was applied to the test carriers for 30 minutes. The assay trays/plates were incubated for 7 days, and the assay was scored for the presence or absence of the test Virus (Spearman-Karber calculation).

		Test Results Replicate 1 30 minutes	Test Results Replicate 2 30 minutes	Test Results Replicate 3 30 minutes
	Cell Control	0 0 0 0	0 0 0 0	0 0 0 0
Dilution	10 <sup>-1</sup>	0 0 0 +	0 0 0 +	0 0 0 0
	10 <sup>-2</sup>	0 0 0 0	0 0 0 0	0 0 0 0
	10 <sup>-3</sup>	0 0 0 0	0 0 0 0	0 0 0 0
	10 <sup>-4</sup>	0 0 0 0	0 0 0 0	0 0 0 0
	10 <sup>-5</sup>	0 0 0 0	0 0 0 0	0 0 0 0
	TCID <sub>50</sub> per 0.1 ml	0.75 Log <sub>10</sub>	0.75 Log <sub>10</sub>	≤0.50 Log <sub>10</sub>
	TCID <sub>50</sub> per Carrier	1.05 Log <sub>10</sub>	1.05 Log <sub>10</sub>	≤0.80 Log <sub>10</sub>
	Average Log <sub>10</sub> Reduction	2.78 Log <sub>10</sub>		
	Average Percent Reduction	99.92%		

**Key:** + = Virus recovered; 0 = Virus not recovered and/or no cytotoxicity observed;  
T = Cytotoxicity observed; <sup>†</sup>Taking cytotoxicity and neutralization controls into account.

**Study Conclusion:** The purpose of the study was to determine the viral efficacy of the AtmosAir SGMH-880 Series Bipolar ionizer against Human Coronavirus Strain 229E with no additional soil load incorporated into inoculum at a contact time of 30 minutes and at an exposure temperature of 25.2 to 25.6C, 46-47%RH.

**The evaluated test device, the AtmosAir SGMH-880 demonstrated an average 2.78 Log<sub>10</sub> reduction (99.92%) in viral titer.**

# AtmosAir vs. Coronavirus on Masks

## 99.44% Reduction in 15 Minutes



**Study Title:** Custom Virucidal Efficacy of a Device

**Test Microorganism:** Human Coronavirus, Strain 229E, ATCC VR-740

**Host Cells:** MRC-5 (ATCC CCL-171)

**Result: 99.44% Reduction in 15 and 30 minutes**

### Test Parameters

- Test Substance Application: Fogging
- Test Articles Tested: Grey Fabric Face Mask
- Contact Time: 15 and 30 Minutes

### **Procedure Summary:**

A volume of 0.200 ml of each virus was inoculated into the front and back of the test sample surfaces. The AtmosAir SGMH-880 was placed in a 1m<sup>3</sup> aerosol chamber near the door of the chamber and about 2 feet from the masks. At the completion of each contact time, each inoculated area of the mask was cut and harvested. For the recovery controls, each of the untreated mask control surfaces were prepared in the same manner. The inoculated cell culture plates were incubated for 7 days. The assay was microscopically scored for the presence or absence of the virus (Spearman-Kärber calculations).

		Test Sample for Grey Fabric - 15 minutes	Test Sample for Grey Fabric - 30 minutes
Dilution	Cell Control	0 0 0 0	0 0 0 0
	10 <sup>-1.30</sup>	0 0 0 0	0 0 0 0
	10 <sup>-2.30</sup>	0 0 0 0	0 0 0 0
	10 <sup>-3.30</sup>	0 0 0 0	0 0 0 0
	10 <sup>-4.30</sup>	0 0 0 0	0 0 0 0
	10 <sup>-5.30</sup>	0 0 0 0	0 0 0 0
	10 <sup>-6.30</sup>	0 0 0 0	0 0 0 0
TCID <sub>50</sub> per 0.1 ml		≤ 0.80 Log <sub>10</sub>	≤ 0.80 Log <sub>10</sub>
Log Reduction		≥2.25 Log <sub>10</sub>	≥2.25 Log <sub>10</sub>
Percent Reduction		≥99.44%	≥99.44%

**Key:** + = Virus recovered; 0 = Virus not recovered and/or no cytotoxicity observed; T = Cytotoxicity observed;

**Study Conclusion:** The purpose of the study was to determine the viral efficacy of the AtmosAir SGMH-880 Series Bipolar ionizer tested against one mask type, against Human Coronavirus Strain 229E at contact times of 15 and 30 minutes and at an exposure temperature of ambient room temperature.

**The evaluated test device, the AtmosAir SGMH-880 demonstrated a 2.25 Log<sub>10</sub> reduction (99.44%) in viral titer at 15 minutes**



# AtmosAir Real World Testing USA

Client	CO <sub>2</sub> Before (PPM)	CO <sub>2</sub> After (PPM)	PM10 Before (ug/m <sup>3</sup> )	PM10 After (ug/m <sup>3</sup> )	PM2.5 Before (ug/m <sup>3</sup> )	PM2.5 After (ug/m <sup>3</sup> )	TVOC Before (PPM)	TVOC After (PPM)	Laboratory Mold Testing	Indiv. VOC Element Testing	Ozone Before	Ozone After	Energy Project
US Department of Defense	614	576	24	7	19	5	n/a	n/a	✓ (-41%)	n/a	n/a	n/a	✓
California Public School	847.5	798.5	23.1	31.37	6.65	6.2	69.25	1.65	✓	n/a	0	0	✗
Arena - Los Angeles, CA	560	470	25	19	n/a	n/a	13	0	✗	Yes	0.015	0	✓
Global Banking Institution 1 - New York, NY	991	1006	6	4	1	1	40	21	✗	n/a	0	0	✗
Florida-based Power Utility Company - Plantation, FL	1046	693	15	6	10	4	5	0	✗	n/a	0	0	✓
Largest Global Architecture Firm - Los Angeles, CA	639	609	6	2	5	3	25	8	✗	n/a	0.024	0	✗
Connecticut-based Public School System	1007	769	12	7	7	1	2	0	✓ (-95%)	n/a	0.001	0	✗
Global Hotel & Resort - New York, NY	491	477	7	6	5	4	10	0	✗	n/a	0	0	✓
Global Banking Institution 2 - New York, NY	485	689	4	2	3	2	8	1	✗	n/a	0	0	✗
Global Banking Institution 3 - New York, NY	726	736	7	8	4	1	150	2	✗	n/a	0.005	0.004	✗
Casino (100k Sq Ft Gaming Space) - Pittsburgh, PA	589	799	91	88	88	96	150	28	✗	n/a	0	0	✗
Vivarium - New York	3000	2995	13	14	1	1	150	116	✗	n/a	0	0	✓
Research - Los Angeles, CA	1087	776	62	17	2	1	22	8	✗	n/a	0	0	✗
Private Research University - Los Angeles, CA	n/a	n/a	9	2	14	2	17	2	✗	n/a	0	0	✓
Medical Center - New York	1268	1074	12	11	10	5	116	61	n/a	n/a	0.01	0.01	✗
West Coast Real Estate Conglomerate - CA	620	691	6	7	4	6	9	6	n/a	✓	0	0	✓
Arena - Nashville, TN	488	385	9	10	9	9	25	1	n/a	n/a	0.008	0	✗
Global Mass Media Company - New York, NY	804	829	5	2	6	2	150	20	n/a	n/a	0	0	✗
Big 4 Accounting Firm - Westlake, TC	508	514	9	7	7	6	150	53	n/a	n/a	0	0	✗
Global Bank Institution 4 - New Jersey	847	989	30	4	28	2	48	30	n/a	n/a	0	0	✗
American Multinational Hospitality Company - Chicago, IL	475	503	4	5	4	4	150	10	n/a	n/a	0	0	✗
Minnesota Public School	904	580	34	12	11	3	6	3	n/a	n/a	0	0	✓
Major Casino - Hollywood, FL			101	55	97	50	119	24	n/a	n/a	0	0	
Tower 45 - 120 West 45th St	1182	1200	6	3	5	2	18	11	n/a	n/a	0	0	✓

# AtmosAir vs. Airborne Staph, MS2 Bacteriophage, E. Coli

Test Report | Antimicrobial Test Laboratories



Microorganism	Test Device	Initial Numbers Control (CFU/m <sup>3</sup> )	Sampling Time Point	Recovery (CFU/m <sup>3</sup> )		Percent Reduction vs. Normalized Number Control	Log Reduction vs. Normalized Number Control
				Normalized Numbers Control	Test Data		
S. saprophyticus ATCC 35552	Matterhorn	4.14E+08	15 Minutes	3.39E+07	2.31E+05	99.32%	2.17
			45 Minutes	4.48E+06	<2.27E+01	99.9995%	5.29

Note: The Limit of Detection (LOD) for this germ is 22.7 CFU/m<sup>3</sup>. Values below the LOD are represented as <2.27E+01 in the chart above and 0 in the graph below.

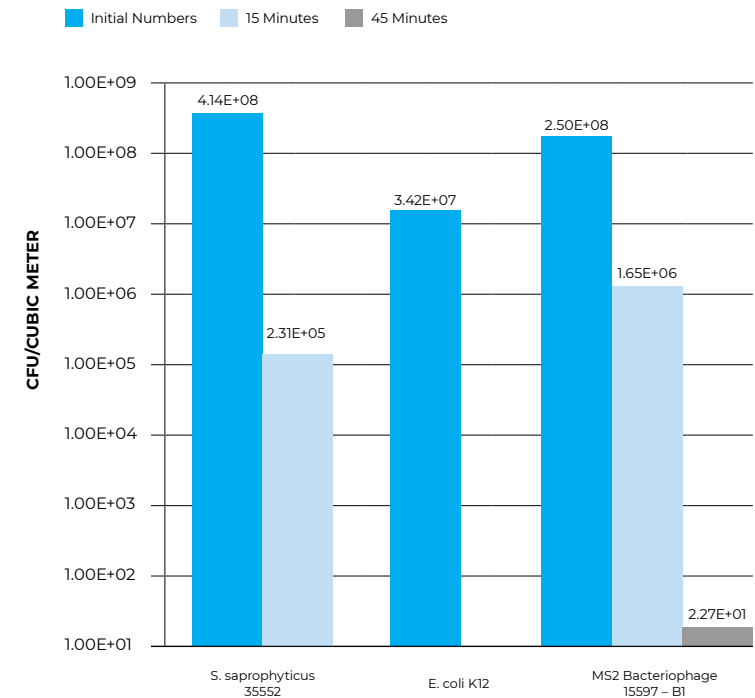
Microorganism	Test Device	Initial Numbers Control (CFU/m <sup>3</sup> )	Sampling Time Point	Recovery (CFU/m <sup>3</sup> )		Percent Reduction vs. Normalized Number Control	Log Reduction vs. Normalized Number Control
				Normalized Numbers Control	Test Data		
E. coli K12	Matterhorn	3.42E+07	15 Minutes	1.18E+06	<7.68E+02	>99.94%	3.19
			45 Minutes	1.61E+05	<2.27E+01	>99.986%	>3.85

Note: The Limit of Detections (LOD) for this germ are 768 CFU/m<sup>3</sup> and 22.7 CFU/m<sup>3</sup> for 15 and 45 minutes, respectively. Values below the LOD are represented as <7.68E+02 and <2.27E+01 in the chart above and 0 in the graph below.

Microorganism	Test Device	Initial Numbers Control (CFU/m <sup>3</sup> )	Sampling Time Point	Recovery (CFU/m <sup>3</sup> )		Percent Reduction vs. Normalized Number Control	Log Reduction vs. Normalized Number Control
				Normalized Numbers Control	Test Data		
MS2 Bacteriophage ATCC 15597-B1	Matterhorn	2.50E+08	15 Minutes	8.84E+07	1.65E+06	98.13%	1.73
			45 Minutes	3.32E+07	2.27E+01	99.99993%	6.17

Note: The Limit of Detection (LOD) for this germ is 22.7 CFU/m<sup>3</sup>. Values below the LOD are represented as <2.27E+01 in the chart above and 0 in the graph on the right

Relative Performance of AtmosAir SGMH-880 when Tested Against Bio-Aerosolized Microorganisms



The results of this study apply to the tested substances(s) only. Extrapolation of findings to related materials is the responsibility of the Sponsor.

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## Test Result

The presence of aerosolized Staph was reduced by 99.32% within 15 minutes. The presence of aerosolized E. Coli was reduced by 99.94% within 15 minutes. The presence of aerosolized MS2 Bacteriophage was reduced by 98.13% within 15 minutes.

# AtmosAir vs. VOCs - Syracuse University Lab Test

## Full-Scale Chamber Testing of Air Cleaner Performance for the Removal of Volatile Organic Compounds

TVOC Testing - Third Party Chamber Testing of AtmosAir vs. VOCs with Syracuse University Center of Excellence Laboratory.

Time from turn on AC (hr)	hexane	2-butanone	iso-butanol	toluene	tetrachloroethylene	hexanal	ethylbenzene	decane
0.000	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
0.225	87.4%	84.3%	68.6%	87.1%	88.7%	79.6%	89.4%	93.7%
1.008	63.9%	63.8%	32.1%	57.4%	61.1%	36.9%	58.9%	65.6%
2.008	43.6%	36.6%	20.9%	31.9%	40.0%	12.9%	34.0%	36.3%
4.075	21.1%	25.7%	9.4%	11.2%	18.8%	5.1%	11.0%	12.4%



### Study Conclusion

Test results showed good regression and repeatability between the two duplicate tests. Test indicated that AtmosAir air cleaners reduced the concentrations in the chamber air (57.12 m<sup>3</sup> in volume) for Hexane by 94.6%, 2-Butanone by 91.1%, Iso-butanol by 97.1%, Toluene by 98%, Tetrachloroethylene by 94.5%, Hexanal by 97.5%, Ethylbenze by 96.3% and Decane by 96.4% over the 6 hours pull-down test period. These corresponded to the equivalent clean air delivery rate (CADR) for the two units tested to range from 12 cfm to 22.5 cfm, depending of the VOCs.

# Third Party Testing

## Global Full Service Hospitality Brand Hotel (600+ rooms)

### Test Result:

Test by Corporate Engineering team saw an average of a 75% reduction of airborne spores after AtmosAir was installed in the rooms that they tested.

### Test Background:

AtmosAir was asked to measure the effect of their air purification systems on the Indoor Air Quality (IAQ) for a number of guest rooms in blind study. AtmosAir bi-polar ionization air purification systems were installed into the fan coil units that serve each room. Air quality measurements were taken both before systems were installed and with the AtmosAir systems operating.

Third party testing was contracted by a global hospitality brand. Testing was completed by Air Quality Assessors of Florida (AQA).

Test Type	Room #	Before	After	Reduction %
<b>RAW Count Mold Spores</b>	2540	110	41	64%
	2327	926	9	99%
	1836	275	20	89%
	1074	19	11	42%
	555	62	12	82%
<b>Outdoor Air</b>	n/a	1	20	n/a
<b>Spores/m3</b>	2540	1467	547	63%
	2327	12347	120	99%
	1836	2333	267	89%
	1074	253	147	42%
	555	827	169	81%
<b>Outdoor Air</b>	n/a	13	276	n/a
<b>TVOC's</b>	2540	3700	1400	62%
<b>Mold VOC's</b>	2540	7	5	29%



# AtmosAir's Effects on Microorganisms

## Bangkok Bank Headquarters

The test was conducted by third party for major bank's headquarters in Bangkok, Thailand to see the difference before and after the installation of AtmosAir systems.

Space		Bacteria cfu/m <sup>3</sup>
Floor 7 - Office	Before	>1307
	After	234

▲ 1st TEST – office on 7th floor reduced at least 82%.

▶ 2nd TEST – Reductions show in almost all index after the installation of AtmosAir. Especially the highlighted bacteria and mold data, the bacteria on 3rd floor Building One reduced at least 92.7% while the mold on 20th floor Building Two reduced at least 67%.

Space		PM2.5	Bacteria cfu/m <sup>3</sup>	Mold cfu/m <sup>3</sup>
<b>Building One</b>				
Floor 3 - Office	Before	36	>1307	107
	After	14	95	107
<b>Building Two</b>				
Floor 2 - Office	Before	22	107	86
	After	8	53	59
Floor 12 - Call Center	Before	26	158	92
	After	11	131	71
Floor 17 - Office	Before	26	162	102
	After	13	146	73
Floor 20 - Office	Before	27	282	146
	After	15	95	48
<b>Singapore Standard</b>		<b>36</b>	<b>500</b>	<b>500</b>

# AtmosAir Bi-Polar Ionisation Tests and Certifications

- US EPA US Energy Star Certification
- Underwriters Laboratories UL 867
- Underwriters Laboratories UL 1995
- Underwriters Laboratories UL 2998
- EU Standard EN 60335-2-40:2003
- EU Standard EN 61000-6-3:2001
- EU Standard EN 61000-6-1:2001
- EU Standard EN 60204-1:2006
- OPA 2807-10
- OPA2808-10
- ANSI / AHAM AC-1 2002
- ASHRAE 62.1 IAQ Procedure Compliant
- 125 DUST CADR
- 190 MOULD CADR



# UL 2998 CERTIFICATION



VERIFIED  
ZERO OZONE

Intertek does hereby certify that an independent assessment has been conducted on behalf of

**ATMOSAIR**

**Certificate Number**

104404620GRR-001

**Certification Issued**

18 September 2020

**Initial Verification Date**

18 September 2020

**Certificate Valid Until**

17 September 2021

**Applicant Address**

418 Meadow Street, Suite 204  
Fairfield, CT 06824 USA

**Product Category**

Appliances & Electronics, Air Cleaners

**Product Details**

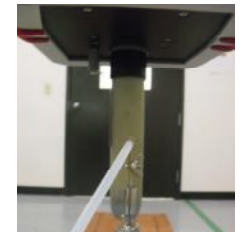
See Appendix

**Conformance Criteria**

Conforms to UL 2998 (3rd Edition, July 10, 2020) clause 6.2, emittance of ozone not exceeding a concentration of 0.005 ppm.

**Issuing Office Name & Address**

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