



**REPORT**  
**INTERTEK ETL-SEMKO DIVISION**  
1717 Arlingate Lane COLUMBUS, OHIO 43228

PROJECT NO.:3129022

DATE: August 24, 2007

REPORT NO. 3129022COL-001

RENDERED TO:  
C&M Airfree Products  
Rua Mouzinho da Silveira, 27-5C  
1250-166 Lisbon, PT

**STANDARD REFERENCED AND TEST METHOD:** ITS Non-Standardized Test: Microbial/Viral Reduction Rate.

**AUTHORIZATION:** The test was authorized by Carlos Matias; A representative from C&M Airfree Products.

**SPECIMEN DESCRIPTION:** The test performed was the Microbial Reduction Rate conducted at the Intertek microbiology lab in Columbus, Ohio. The Air Purifier was tested for its ability to reduce the number of microorganisms in a test chamber. The sample was received on June 23, 2007 and is currently a production model. The test chamber was contaminated with *Serratia marsescens*, *Aspergillus niger*, *Penicillium citrinum* and MS2.

**TEST DESCRIPTION**

Nutrient agar was prepared for the bacteria cultures, potato dextrose agar was prepared for the fungus and mold cultures and tryptic soy agar was prepared for viral cultures.

All agars were sterilized using an autoclave to a temperature of 121°C.

The bacterial cultures were prepared using pre-grown cultures acquired from ATCC (American Type Culture Collection with respective numbers describing each microorganism).

Using an inoculating loop, the cultures were transferred daily in nutrient/potato dextrose/yeast broth for not more than two weeks. Nutrient broth was used for the growth of bacteria and some viruses. Potato dextrose broth was used for the growth of fungi. Yeast broth was used for the growth of mold. At the conclusion of two weeks, a fresh transplant from stock culture was made. Bacterial cultures were incubated at 37 ± 2°C for 24 hours. Fungal cultures were grown at 28-30°C and 85% relative humidity for 28 days. Mold cultures were grown at 30-32°C and 85 % relative humidity for 28 days.

The stock cultures were maintained on nutrient agar. Cultures were stored at 5 ± 1°C and transfer once a month.

This operation was completed for each microorganism.

Samples were set in the center of the testing room. Activation was performed either by remote control or by manipulation of the power source from outside the chamber.

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The microorganisms were measured to the specified amount to achieve the threshold of  $1 \times 10^8$ . The microorganism was then added to sterile buffered demineralized water (SBDW), pH of 7.2 +/- 0.2. This combination was then put into the collision nebulizer.

The collision nebulizer was then put into the test chamber where it was attached to an Erlenmeyer vacuum flask and a nitrogen tank. The nozzle of the flask pointed outward toward the room.

The room (411.4 cubic feet) was now sealed and a negative control was taken. This ensures that there were no other microorganisms in the test chamber prior to testing.

The nitrogen for the aspirator was set and started for aspiration into the test chamber.

A positive control sample of the air was now to be taken. This provided reaffirming data that the correct amount of the microorganism was put into the test chamber.

Samples were taken every 15 minutes from the air sampler that was attached to the chamber wall. The agar plates were put into the air sampler and the microorganism was vacuumed onto the plate.

The bacteria and viral samples were then put into the incubator at  $37 \pm 2^\circ\text{C}$  and allowed to grow for 48 hours. The fungal samples were put into the growth chamber at  $28-30^\circ\text{C}$  and 85% relative humidity and allowed to growth for 2-3 days. The mold samples were put into the growth chamber at  $30-32^\circ\text{C}$  and 85 % relative humidity and allowed to grow for 2-3 days.

This process was repeated as above, this time the air cleaner was turned on at time zero or when you take the first sample. These results were then compared to the natural decay of the microorganism to arrive at percent reduction.

This Intertek procedure is typically run on a two hour time frame with samples taken at 5 minute intervals. Mr. Carlos Matias requested the test be run for four hours with samples taken at 15 minute intervals.

**CALIBRATED EQUIPMENT:**

CE 1141- Micropipette (Fisherbrand)

CE 1142-Environmental Chamber (Thermotron) Model SM 3.5S

CE 1155-Incubator (Precision)

CE 1140-Environmental Chamber (LR Technologies)

**RESULTS:**

The negative controls showed no signs of growth.

The positive controls showed complete growth over the agars surface. The original number of each microorganism aspirated into the chamber was  $1 \times 10^8$  cfu/ml.

*S. marsescens* has shown;

A 63.2% reduction from the natural decay at 165 minutes

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*A. niger* has shown;

No reduction is able to be determined

*P. citrinum* has shown;

At least a 78.8% reduction from the natural decay setting at 195 minutes

MS2 has shown:

A 54.4% reduction from the natural decay setting at 150 minutes

Please see following pages for raw data breakdown.

**CONCLUSION:** This report documents the performance of the Air Purifier. The microbiological test sample evaluations were conducted at the Intertek laboratory located in Columbus, OH between August 2, 2007 and August 15, 2007.

*Serratia marsescens*

Time (minutes)	Natural Decay (colonies) CFU	Air Purifier (colonies) CFU
0	TNTC	TNTC
15	TNTC	TNTC
30	TNTC	TNTC
45	TNTC	TNTC
60	TNTC	TNTC
75	TNTC	TNTC
90	TNTC	TNTC
105	TNTC	TNTC
120	TNTC	946
135	494	255
150	380	160
165	334	123
180	235	95
195	144	80
210	106	72
225	75	53
240	14	12

TNTC: TOO NUMEROUS TO COUNT &gt; 1000 COLONIES

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*Aspergillus niger*

Time (minutes)	Natural Decay (colonies) CFU	Air Purifier (colonies) CFU
0	TNTC	TNTC
15	TNTC	TNTC
30	TNTC	TNTC
45	TNTC	TNTC
60	TNTC	TNTC
75	TNTC	TNTC
90	TNTC	TNTC
105	TNTC	TNTC
120	TNTC	TNTC
135	TNTC	TNTC
150	TNTC	TNTC
165	TNTC	TNTC
180	TNTC	TNTC
195	TNTC	TNTC
210	TNTC	TNTC
225	TNTC	TNTC
240	TNTC	TNTC

TNTC: TOO NUMEROUS TO COUNT &gt; 1000 COLONIES

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*Penicillium citrinum*

Time (minutes)	Natural Decay (colonies) CFU	Air Purifier (colonies) CFU
0	TNTC	TNTC
15	TNTC	907
30	TNTC	694
45	TNTC	542
60	TNTC	490
75	TNTC	410
90	TNTC	362
105	TNTC	257
120	TNTC	331
135	TNTC	284
150	TNTC	284
165	TNTC	242
180	TNTC	231
195	TNTC	212
210	136	125
225	126	95
240	96	80

TNTC: TOO NUMEROUS TO COUNT &gt; 1000 COLONIES

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**MS2**

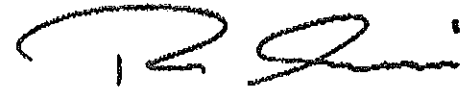
Time (minutes)	Natural Decay (colonies) CFU	Air Purifier (colonies) CFU
0	TNTC	TNTC
15	TNTC	TNTC
30	TNTC	TNTC
45	TNTC	699
60	TNTC	677
75	853	620
90	837	550
105	756	372
120	723	357
135	671	322
150	583	266
165	526	264
180	477	240
195	310	221
210	197	200
225	159	121
240	140	111

TNTC: TOO NUMEROUS TO COUNT &gt; 1000 COLONIES

Test Performed by:


Shannon Meier  
Microbiologist

Report Approved by:


Ramzi Amawi  
Engineering Manager**Subject: An independent organization testing for safety, performance, and certification.**

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