

RADIC 8 *IN3* air

TEST RESULTS

DG
@ BUSINESS
Division of Sharaf **DG**

TESTING OF VIRUSKILLER™

For many years, the **Radic8's** sterilisation chamber has been **vigorously tested** by many independent facilities and institutions:

ON A SINGLE AIR PASS

The **kill rate on viruses** has always been **99.9999%**

Test results and certificates provided in separate pack



Viruses



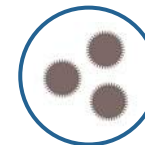
Bacteria



Fungi



VOCs



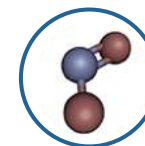
Particulate Matter
(including Ultra Fine particles)



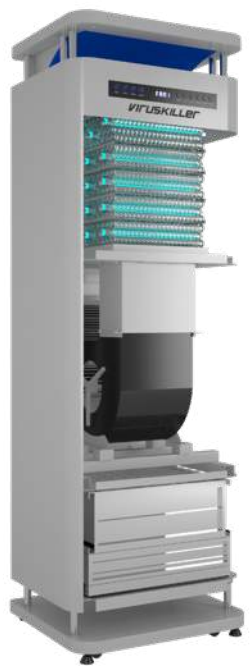
Mould



Toxic Gas



Nitrogen Dioxide



Viruskiller™ is the most extensively tested clean air technology in the world

For many years, the Radic8's sterilisation chamber has been vigorously tested by many independent facilities and institutions and the results on airborne pathogens are the same for all of the viruskiller range.



Inactivation of major airborne viruses

Kangwon National University (KNU)



Date of test: 2004

Coronavirus

To test if the Viruskiller technology could neutralise the virus, it was used a 10^6 Plaque Forming Unit (PFU) of Coronavirus DF2 into a 50ml PBS (liquid solution). The experiment was conducted three times.

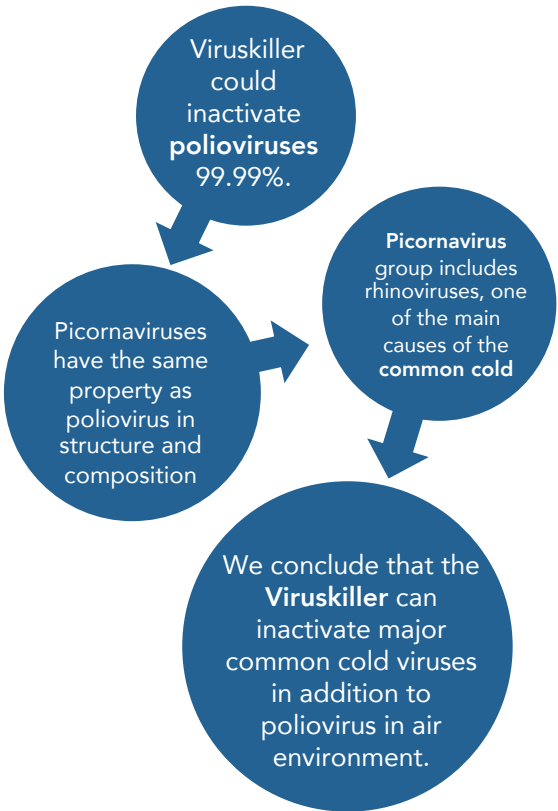
The concept of PFU of viruses is equivalent to the concept of bacteria colony formations.

Each of the four viruses tested belongs to one of the four main respiratory virus group types.

We therefore can claim 99.9999% efficiency on ALL respiratory viruses

Kind of virus		Quantity of virus used	Results	Remarks
Polio Virus	Experiment 1	10^6 PFU/ 100ml	None detection (99.9999%)	Test by Institute of Medical Science & Department of Microbiology, School of Medicine, National Kangwon University
	Experiment 2	10^6 PFU/ 100ml	None detection (99.9999%)	
	Experiment 3	10^6 PFU/ 100ml	None detection (99.9999%)	
Influenza Virus	Experiment 1	10^6 TCID ₅₀ / 100ml	None detection (99.9999%)	
	Experiment 2	10^6 TCID ₅₀ / 100ml	None detection (99.9999%)	
	Experiment 3	10^6 TCID ₅₀ / 100ml	None detection (99.9999%)	
Adeno Virus	Experiment 1	10^6 TCID ₅₀ / 100ml	None detection (99.9999%)	
	Experiment 2	10^6 TCID ₅₀ / 100ml	None detection (99.9999%)	
	Experiment 3	10^6 TCID ₅₀ / 100ml	None detection (99.9999%)	
Corona Virus	Experiment 1	10^6 PFU/ 50ml	None detection (99.9999%)	
	Experiment 2	10^6 PFU/ 50ml	None detection (99.9999%)	
	Experiment 3	10^6 PFU/ 50ml	None detection (99.9999%)	

Inactivation of major airborne viruses



Description	Cell line of negative	Cell line of positive	Experiment G. 1	Experiment G. 2	Experiment G. 3
Polio Virus					
Influenza Virus					
Adeno Virus					
Corona Virus					

Removal ability of various bacteria, fungi and mould

Sungkyunkwan University



SUNG KYUN KWAN
UNIVERSITY

Kyunggi Medicine Research

Centre: Date of test: 2004

Various kinds of micro-organisms are co-existing in our everyday living space. Some can be responsible for fatal diseases.

VirusKiller eradicated ALL bacteria and fungi during the testing

Kind and Classification of Strain		Strain dosage	Detected amount of Strain (CFU/m3)
S. Aureus subsp. Aureus KCTC 1928	Experimental Group 1	10 ⁶ / 30ml	None detection
	Experimental Group 2	10 ⁶ / 30ml	None detection
	Experimental Group 3	10 ⁶ / 30ml	None detection
	Positive Control Group	10 ⁶ / 30ml	256
	Negative Control Group	0 ⁶ / 30ml	None detection
S. pyogenes KCTC 1928	Experimental Group 1	10 ⁶ / 30ml	None detection
	Experimental Group 2	10 ⁶ / 30ml	None detection
	Experimental Group 3	10 ⁶ / 30ml	None detection
	Positive Control Group	10 ⁶ / 30ml	290
	Negative Control Group	0 ⁶ / 30ml	None detection
S. pneumoniae KCTC 2241 (gram positive)	Experimental Group 1	10 ⁶ / 30ml	None detection
	Experimental Group 2	10 ⁶ / 30ml	None detection
	Experimental Group 3	10 ⁶ / 30ml	None detection
	Positive Control Group	10 ⁶ / 30ml	312
	Negative Control Group	0 ⁶ / 30ml	None detection

Removal ability of various bacteria, fungi and mould

Sungkyunkwan University



Kyunggi Medicine Research
Centre

Date of test: 2004

All the test results were obtained using only our sterilisation chamber: Without the filters!

TUBERCULOSIS is a disease spread by airborne bacteria

Viruskilliller has been also tested on **MYCOBACTERIUM TUBERCULOSIS**

The kill rate in all the experiments was **99.9999%**

Kind and Classification of Strain		Strain dosage	Detected amount of Strain (CFU/m ³)
E. Coli DH 5a (gram negative)	Experimental Group 1	10 ⁶ / 30ml	None detection
	Experimental Group 2	10 ⁶ / 30ml	None detection
	Experimental Group 3	10 ⁶ / 30ml	None detection
	Positive Control Group	10 ⁶ / 30ml	275
	Negative Control Group	0 ⁶ / 30ml	None detection
K. pneumoniae KCTC 2241	Experimental Group 1	10 ⁶ / 30ml	None detection
	Experimental Group 2	10 ⁶ / 30ml	None detection
	Experimental Group 3	10 ⁶ / 30ml	None detection
	Positive Control Group	10 ⁶ / 30ml	391
	Negative Control Group	0 ⁶ / 30ml	None detection
A. niger KCTC 6089	Experimental Group 1	10 ⁶ / 30ml	None detection
	Experimental Group 2	10 ⁶ / 30ml	None detection
	Experimental Group 3	10 ⁶ / 30ml	None detection
	Positive Control Group	10 ⁶ / 30ml	much
	Negative Control Group	0 ⁶ / 30ml	None detection
R. oryzae KCTC 6062	Experimental Group 1	10 ⁶ / 30ml	None detection
	Experimental Group 2	10 ⁶ / 30ml	None detection
	Experimental Group 3	10 ⁶ / 30ml	None detection
	Positive Control Group	10 ⁶ / 30ml	much
	Negative Control Group	0 ⁶ / 30ml	None detection

Removal ability of various harmful gases

Korea Testing Laboratory



Date of test: 2011

Viruskiller removed the **hazardous gases** within 120 minutes

Substance	30 minutes	60 minutes	90 minutes	120 minutes
Acetaldehyde	91%	97%	98%	100%
Acetic Acid	100%	100%	100%	100%
Toluene	100%	100%	100%	100%

Substance	Removal
Nitrogen Dioxide	More than 99.5 %

Removal ability of Volatile Organic Compounds (VOC's) and particulate matter

Korea Testing Laboratory



Date of test: 2011

In the case of volatile organic compounds, two samples were tested.

The measurement area for particulate matter and dust emissions is weighed before and after the sampling.

Substance	Limit of KOA AS 01 Hourly Discharge (Mg)	Results	Remarks
Particulate matter	4.0 under	0.83	mg/h
VOC's	18.0 under	0.088	
Acetaldehyde	1.8 under	0.24	
Formaldehyde	1.8 under	0.063	

* **KOA**: Korea Ozone Association

** Test Method: KOA AS 01 is the test standard for Korea Air Sterilizer Association

Testing of Ozone release

Korea Testing Laboratory



Date of test: 2016

Because no ozone is created, it's not harmful to old people or children.

Ozone free

The ozone release shall not exceed an 8-hour average of 0.05×10^{-6} and an 8-hour maximum of 0.1×10^{-6}

Limit of KOA* AS** 01	Viruskiller test result	Remarks
0.05×10^{-6} under	-0.014ppm (Below "0" means no detection)	8 hours test

* KOA: Korea Ozone Association

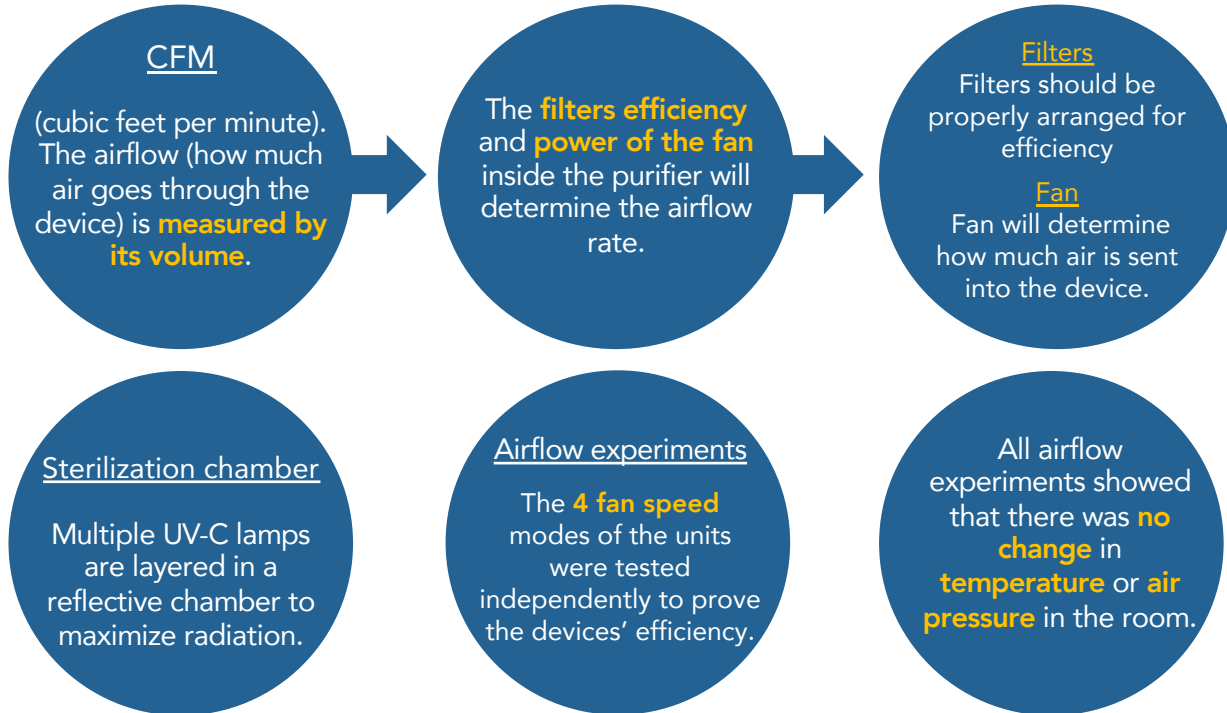
** Test Method: KOA AS 01 is the test standard for Korea Air Sterilizer Association

IMPORTANCE OF TESTING THE AIRFLOW

TEST RESULTS AND REPORTS

Testing of airflow

Airflow is very important for the **efficiency** of an indoor air sterilizer



TEST RESULTS AND REPORTS

Testing of airflow

Korea Aerospace University



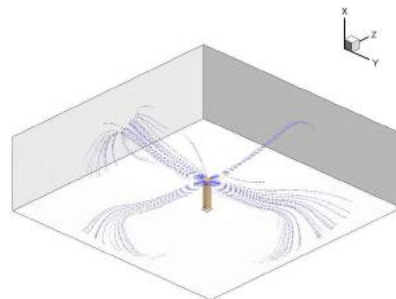
Date of test: 2006

Efficient coverage

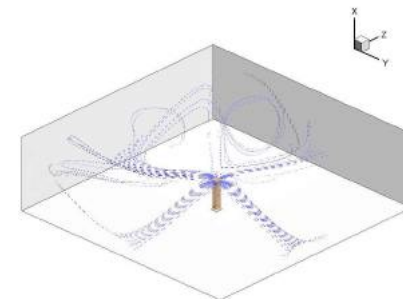
The four fan modes tests show that the airflow reaches all corners of the room.

Viruskiller units control the airflow: **Clean air** is sent to the **breathing zone** from the top of the unit (four directions).

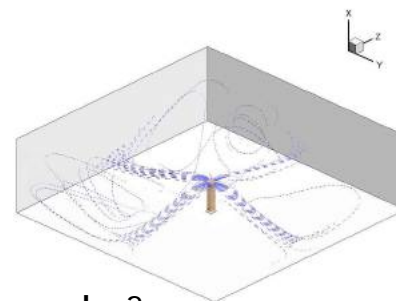
The sterilised air pushes the **contaminated air** to the **ground**, to pull it up again from the bottom of the unit.



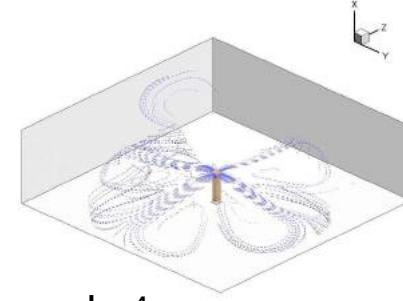
Fan mode: 1



Fan mode: 2



Fan mode: 3



Fan mode: 4

The images show computer fluid dynamic simulations and examples of effective air flow control.

Testing of airflow

The '**single air pass**' kill rate of the technology used is important because '**pathogen-free**' air is distributed back into the room.



REAL TIME PROTECTION FOR OCCUPANTS

Effective air flow control does not only reduce **airborne** and **droplet** disease transmission risk, but also greatly reduces **direct** and **indirect** contact disease transmission risk as there is far less surface settlement.



Eco label Certified Product

- Eco-Label Certified issued by Korea Eco-Product Institute
- Global Ecolabelling Network (GEN) is an international association of 'Eco-labelling Program' agencies. Korea joined GEN in 1997, and has been an active member since.
- The 'Ecolabelling Program' is undertaken by governments and agencies in approximately 40 countries - including Korea, EU, Nordic Countries, Singapore, Australia, Japan...



Thanks to our tech with low noise & decreasing the amount of ozone creation we received an Eco-Label Product recognition by the Korean Government.

CORONAVIRUS TEST CERTIFICATE

Certificate of VirusKiller Performance

It is certified that test the result on inactivation of infectious virus by INB Co.,Ltd Viruskiller manufactured was as follows:

1. Product : Viruskiller(manufactures by INB Co., Ltd.) President : Lee, Knae-Soo
#522, Unitechvil, Baeksuk-dong, Iseo-gu, Koyang-si, Kyunggi-do, Korea

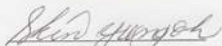
2. Virus and its titer used for inactivation :
Corona virus DF2 (the same family as SARS virus), 10⁶ PFU/ 50 ml

3. Cell line used for virus infectivity :
CRFK cell line for corona virus

4. Test methods: Infectivity of the specimen obtained from filters catching exit air after the input of virus into the air cleaner by aerosol spray in 50 ml solution with the above titer of virus was tested for viral presence by cytopathic effect observation on cell culture.

5. Test result: No multiplicity of virus from the above test specimen was demonstrated. Namely, the air cleaner inactivated all the viruses added for the test. So the VirusKiller prevented the virus passage perfectly(100%).

26, July, 2004



Prof. Shin, Yungoh, Ph. D.
Director of Virology Laboratory

Institute of Medical Sciences,

School of Medicine National Kangwon University

(Virus Reference Laboratory Designated by National Environment Research Center)

2. Virus and its titer used for inactivation :

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NITROGEN DIOXIDE TEST REPORT

Electronic Document
Version



TEST REPORT

999-020-690-070

1. No : 0716-087289
 2. Client
 ○ Name : INB air Co.,Ltd.
 ○ Address : 402, 16, Beotkkot-ro 12-gil, Guseong-gu, Seoul, Korea
 3. Date of Test : 2016.07.29 ~ 2016.08.09
 4. Use of Report :
 5. Test Sample : VK-002
 6. Test Method
 (1) SP9-KACAO02-102:2016

Reissuance (R1)
 Date : 2016.08.09

7. Test Results

1) VK-002

Test Item(s)	Unit	Test method	Test Results	Remark
Noxious Gas Removal Ratio(Nitrogen Dioxide, NO ₂)	%	(1)	More than 99.5	(21 ± 1) °C (45 ± 5) % R.H.

* Test Mode : FMS(Rated Air Flow Rate)

----- End of Report -----

7. Test Results

1) VK-002

Test Item(s)	Unit	Test method	Test Results	Remark
Noxious Gas Removal Ratio(<u>Nitrogen Dioxide</u> , NO ₂)	%	(1)	<u>More than 99.5</u>	(21 ± 1) °C (45 ± 5) % R.H.

* Test Mode : FAN3(Rated Air Flow Rate)

----- End of Report -----

Affirmation	Tested By Name : Bang Kyun Park	Technical Manager Name : Jin Sung Park
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Our report refers only to the standards or procedures identified and to the sample(s) tested unless otherwise specified. The test results are not indicative of representativeness of the quality of the lot from which the sample was taken or of accuracy of identified or similar products.

2016.08.09
Korea Conformity Laboratories President Kyung Sik Kwon

Address : 08503 199, Gusan digital 1-ro, Guseong-gu, Seoul, Korea 82-2-2102-2600
 Result Inquiry : Electric & Electronic Test 82-2-2102-2719

VIRUSKULLER ON-SITE TESTS IN SOUTH KOREA

REMOVAL OF VARIOUS BACTERIA, FUNGI AND MOULD

ON - SITE TESTS

Problem	Test	Results
<p>Bacteria, fungi and mould are a big concern in indoor public spaces or shared areas.</p> <p>They cause harmful effects for our health such as: allergies, infections, immune deficiency or even cancer.</p>	<p>DISK DIFFUSION AGAR TEST</p> <p>The air contamination (living bacteria, fungi & mould) will spread on the Agar plate if present</p>	<p>The Agar plates with colonies of bacteria, fungi or mould are checked before and after the installation of the Viruskiller.</p> <p>If they are still living organisms, they will have the ability to grow.</p>

CFU / m³

Colony Forming Unit

CFU is a unit used to estimate the number of bacteria or fungal cells in a sample.

Air contamination is expressed as **CFU/m³ of air**

Each bacteria or fungus is a CFU: it can create a colony if it's a living microorganism.



Viruskiller has proven to turn the tested sites into more hygienic areas after neutralising the microorganisms

REMOVAL OF VARIOUS BACTERIA, FUNGI AND MOULD

Site section	Site name	Test site	Before installation (cfu/m ³)	After installation (cfu/m ³)	Decrease Rate (%)
Zoo	Samsung Everland	Penguin's cage	1875	100	95 %
Zoo	Samsung Everland	Operating room	1063	125	90 %
Resort	HyundaiSungwoo Resort	Restaurant	60	2	97 %
Resort	HyundaiSungwoo Resort	Lobby	240	10	95 %
Hospital	Soonchunhyang hospital	Intensive Care counter	2001	138	93 %
Hospital	Sungmo ophthalmic hospital	Operation room	300	30	90 %
School	Gyoungwoon School	Music clinic	875	50	95 %
School	Sinnamsung School	Dining room	1000	63	94 %

All on-site
test results
available on
request

REMOVAL OF VARIOUS BACTERIA, FUNGI AND MOULD

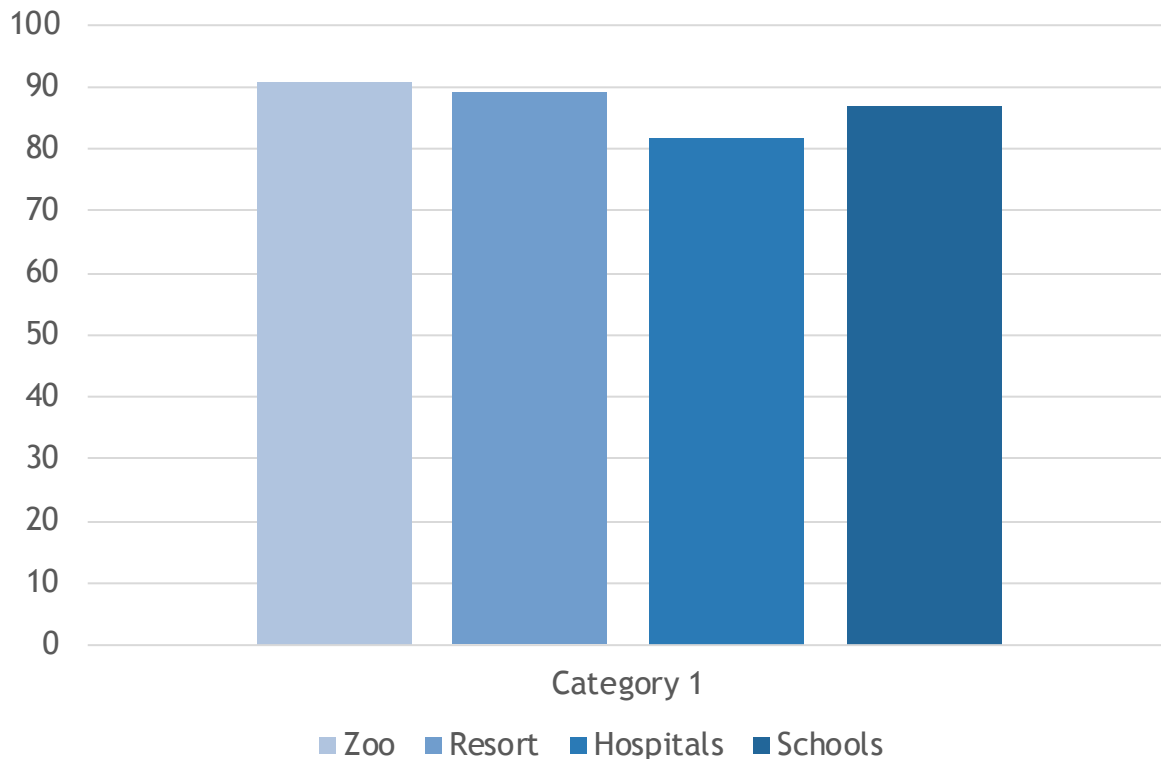
Average contaminants decrease rate

Viruskiller units were placed in different areas of various locations such as hospitals, a zoo, a resort, a factory, schools, offices, households...

The decrease rate of bacteria, fungi and mould was significant in all the cases after installing our technology.

Decrease rate

Zoo: 91%
Resort: 89,3%
Hospitals: 82%
Schools: 87%





We Share
Clean Air

RADIC **8** **IN** air