



MTF | **SAMSUNG**

Sales Talk 1

über das Samsung Hygiene Konzept zum
Bakterien- und virenfreien Betrieb mit
Wind-Free™ 1-Weg Deckenkassetten

Die 3 Stufen Raumlufth Sterilisation mit dem
Hygiene Paneel sorgt für hygienische Raumlufth

Aufklärung durch das Umweltbundesamt (UBA) für die Nutzung von Raumklimageräten



Aufklärung durch das Umweltbundesamt (UBA) für die Nutzung von Raumklimageräten während einer Pandemie, z.B. Corona

„Zum Betrieb von Raumklimageräten in Split-, Multisplit- und VRF-Ausführung stellt das Umweltbundesamt (UBA) fest:

Dezentrale Klimageräte, die nur einzelne Räume in einer Wohnung oder einem Gewerbegebäude kühlen, heizen und entfeuchten übertragen keine Viren von einem Raum in andere Bereiche des Gebäudes. Auch eine Vermehrung von u.a. Corona-Viren im Klimagerät schließt das UBA aus, da Viren zu ihrer Vermehrung Wirtszellen brauchen, beispielsweise menschliche Zellen. Die Geräte können also unbesorgt weiter betrieben werden.

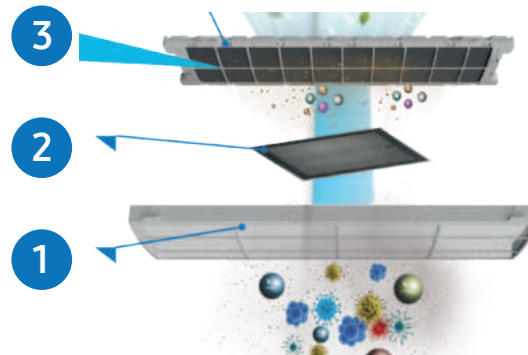
Um die Virenlast im Raum möglichst gering zu halten ist es jedoch wichtig, eine effektive Filterung bzw. Belüftung sicherzustellen.“
Mit dem für Samsung patentierten Wind-Free™ Betrieb ist der Nutzer optimal geschützt, weil er keinem direkten Luftzug ausgesetzt ist.

Zudem bietet Samsung eine wirksame 3 Stufen Raumluft Sterilisation mit dem Hygiene Paneel an.

Bakterien und Viren wirksame 3 Stufen Raumlufth Sterilisation für hygienische Raumlufth mit dem Hygiene Paneel für Wind-Free™ 1-Weg Deckenkassetten



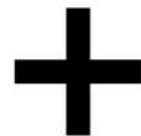
Kühlen / Heizen



Eine Sterilisation in 3 Stufen für hygienische Raumlufth



Innengerät



Hygiene Paneel mit 3 stufiger Raumlufth Sterilisation

Bakterien und Viren wirksame 3 Stufen Raumlufte Sterilisation für hygienische Raumlufte mit dem Hygiene Paneel für Wind-Free™ 1-Weg Deckenkassetten

Das Hygienekonzept für Wind-Free™ 1-Weg Deckenkassetten

Veranschaulichung & Demo

Grundsätzlich ist ein Luftstrom von der Decke zum Boden optimaler als ein Luftstrom vom Boden zur Decke. Bakterien, Viren und andere Partikel (Aerosole) werden direkt von den Atemwegen und Schleimhäuten weg transportiert. Samsung bietet Hygiene Paneele mit 3 stufiger Raumlufte Sterilisation (bestehend aus einen Vorfilter, einem Desodorierfilter und einem elektrostatisch geladenen PM1 Filter) an. Diese 3 Filterstufen und der Wind-Free™ Betrieb garantieren eine hygienische Raumlufte.

1 Vorfilter

Der Vorfilter filtert bereits diverse Schmutzpartikel aus der angesaugten Raumlufte z.B. Staubpartikel, Ballaststoffe, Aerosole usw. Der Abscheidegrad ist 80-90 %. Das entspricht der Filterklasse DIN EN 779 - DIN EN ISO 16890 (vormals F7). Mit der Verwendung dieses Filters wird bereits eine deutliche Reduzierung der Raumluftebelastung erreicht.

Übersicht der Coarse Partikel / Aerosole

Hausstaub	0.05 ~ 100 µm
Pollen	6 ~ 100 µm
Haare	40 ~ 100 µm
Sand/Staub	62 ~ 100 µm

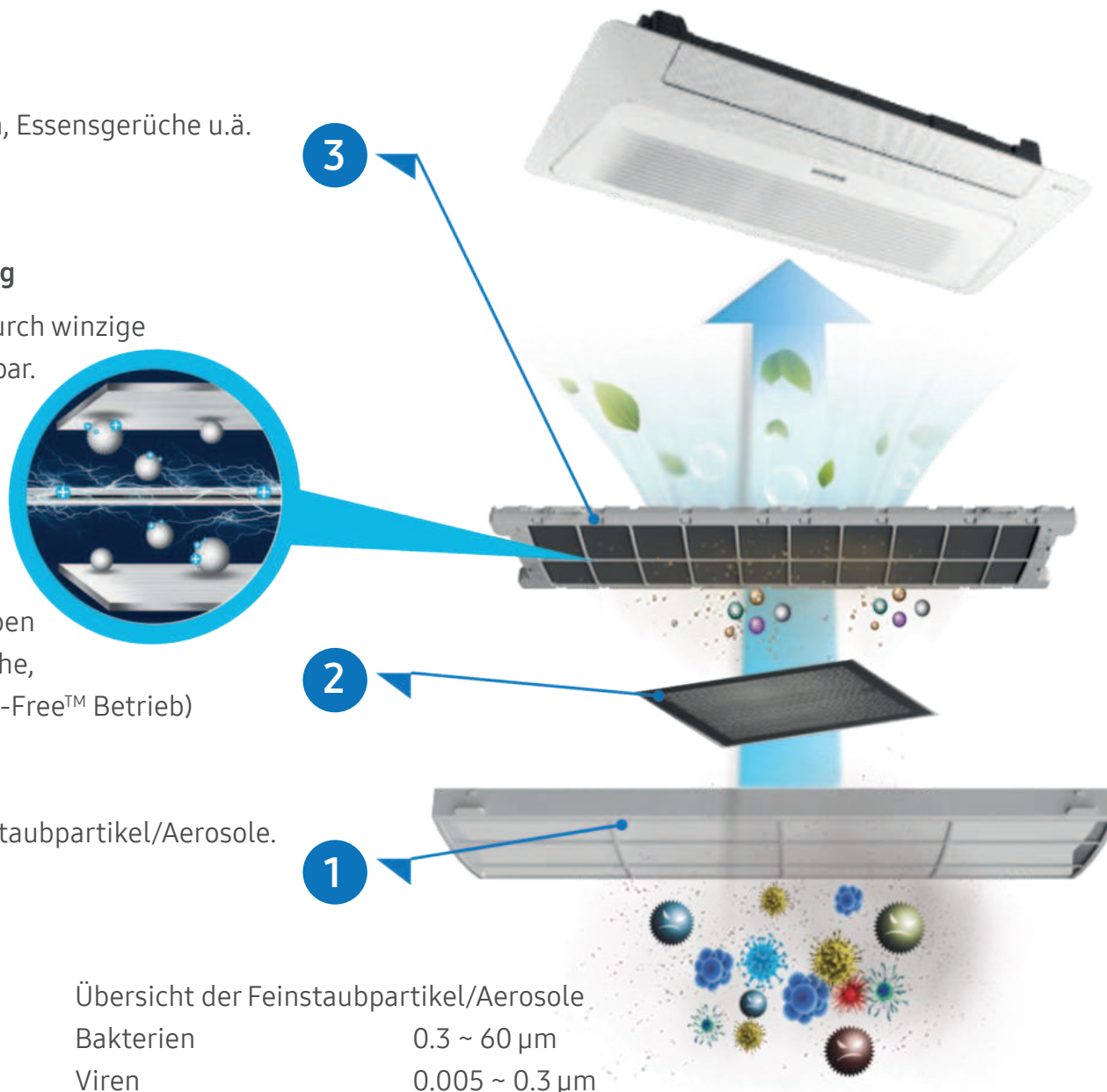
2 Der Desodorierfilter

filtert unangenehme Gerüche wie z.B. Zigarettenrauch, Essensgerüche u.ä. aus der Raumluft.

3 Samsung PM1 Filter mit elektrostatischer Ladung

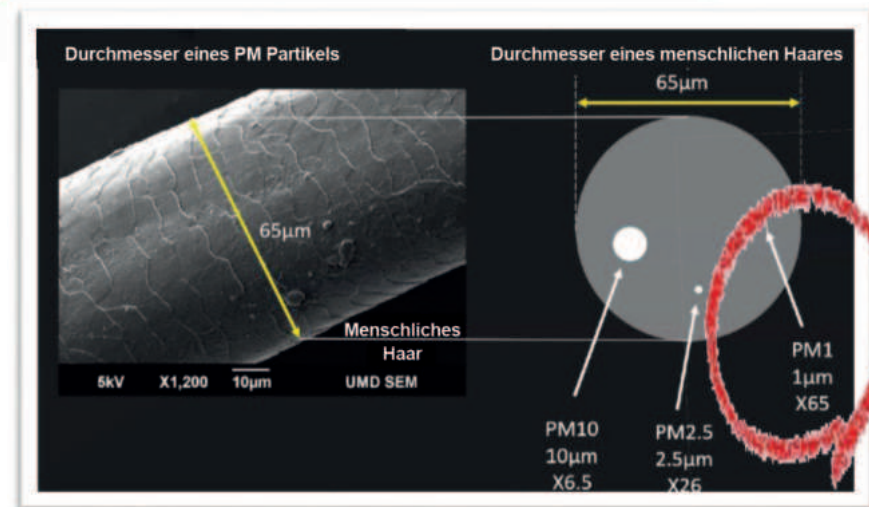
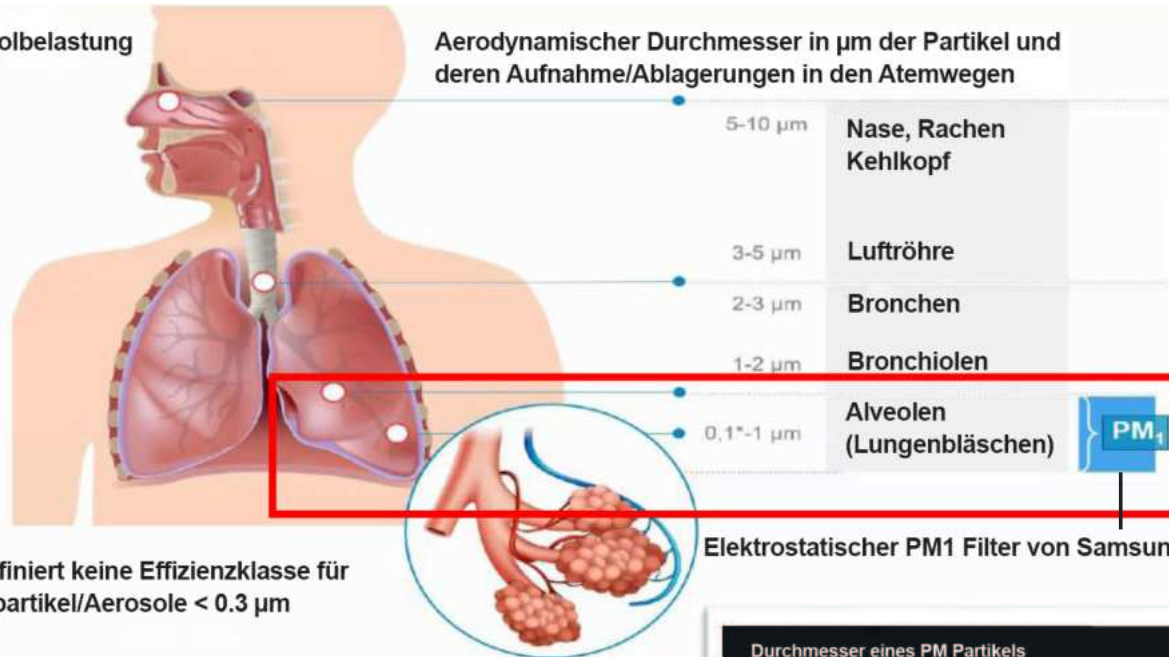
Die hintersten Bereiche unserer Atemwege sind nur durch winzige Ultra-Feinstaubpartikel/Aerosole der Größe PM1 erreichbar. Je nach Größe können diese Partikel die Wände unserer Atemwege passieren. Der Samsung PM1 Filter mit elektrostatischer Ladung schützt die Atemwege wirksam. Ultra-Feinstaubpartikel, Bakterien und Viren mit einer Größe von $0.3\text{ }\mu\text{m}$ werden mit Auftreffen auf den Filter elektrostatisch positiv geladen und bleiben an der negativ geladenen Filterseite haften. Hygienische, sterilisierte und konditionierte Luft wird zugfrei (Wind-Free™ Betrieb) in den Raum abgegeben.

Nachstehend eine Übersicht über die gefilterten Feinstaubpartikel/Aerosole.



Bakterien und Viren wirksame 3 Stufen Raumlufth Sterilisation für hygienische Raumlufth mit dem Hygiene Panel für Wind-Free™ 1-Weg Deckenkassetten

Feinstaubpartikel/Aerosolbelastung der Atemwege im Detail



Bakterien und Viren wirksame 3 Stufen Raumlufth Sterilisation für hygienische Raumlufth mit dem Hygiene Paneel für Wind-Free™ 1-Weg Deckenkassetten

Semi-Permanent waschbarer ISO PM1 Filter

Der Samsung ISO PM1 Filter ist waschbar und wiederverwendbar. Das reduziert die Wartungs- und Instandsetzungskosten und macht den Einsatz der Geräte hygienisch und gleichzeitig wirtschaftlich.

Den Filter in einer leichten, warmen Seifenlauge für circa 30 Minuten einweichen.

Den Filter einer Lufttrocknung unterziehen. Bitte nicht der direkten Sonnenstrahlung aussetzen.



Bakterien und Viren wirksame 3 Stufen Raumluf Sterilisation für hygienische Raumluf mit dem Hygiene Paneel für Wind-Free™ 1-Weg Deckenkassetten

Zertifizierung der Filtereigenschaften

Das international akkreditierte Institut intertek bestätigt mit Prüfberichten die Feinstaubfilterung und die Bakterien und Viren Sterilisationseffizienz von bis zu 99 %.

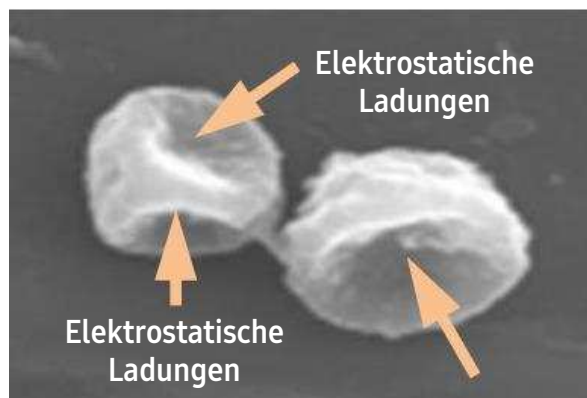
Mikroorganismen wie z.B. Escherichia coli, Staphylococcus aureus ua. werden durch die elektrostatische Ladung im PM1 Filter zerstört.



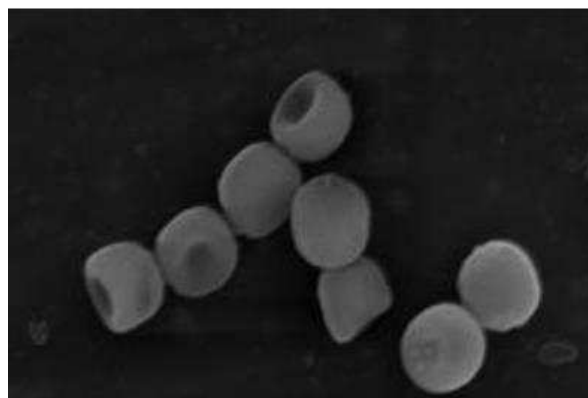
*** Intertek report No.: RT20E-S0010-R**

Den vollständigen Prüfbericht finden Sie ab Seite 13.

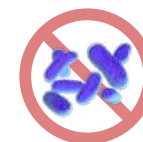
Sterilisation



Zerstört



※ Aufgenommen mit einem Elektronenmikroskop



Escherichia coli



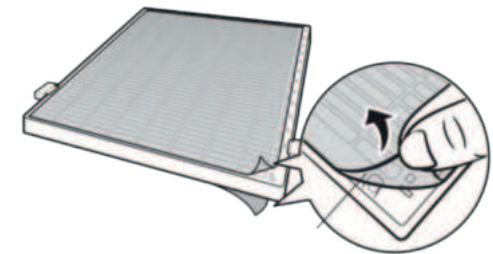
Staphylococcus aureus

Bakterien und Viren wirksame 3 Stufen Raumluf Sterilisation für hygienische Raumluf mit dem Hygiene Paneel für Wind-Free™ 1-Weg Deckenkassetten

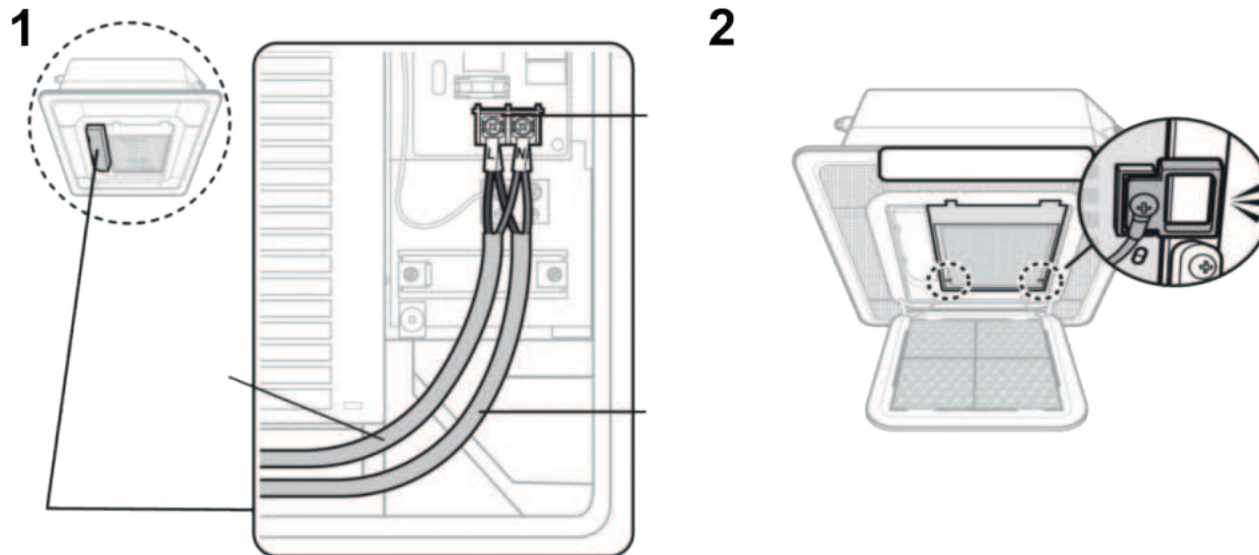
So wird der Samsung ISO PM1 Filter elektrotechnisch angeschlossen.

1. Das Paneel mit dem Kassettenkorpus verbinden.
2. Den ISO PM1 Filter aus dem Paneel nehmen.
3. Entfernen Sie die Schutzfolie auf beiden Seiten des Filters.
Die Kabel vom Filter an den Klemmblock im Kassettenkorpus anschließen.
4. Nutzen Sie die Infrarot-oder Kabelfernbedienung um den Installation-Code für die ISO PM1 Filterfunktion auf dem Innengerät zu installieren.

3



4



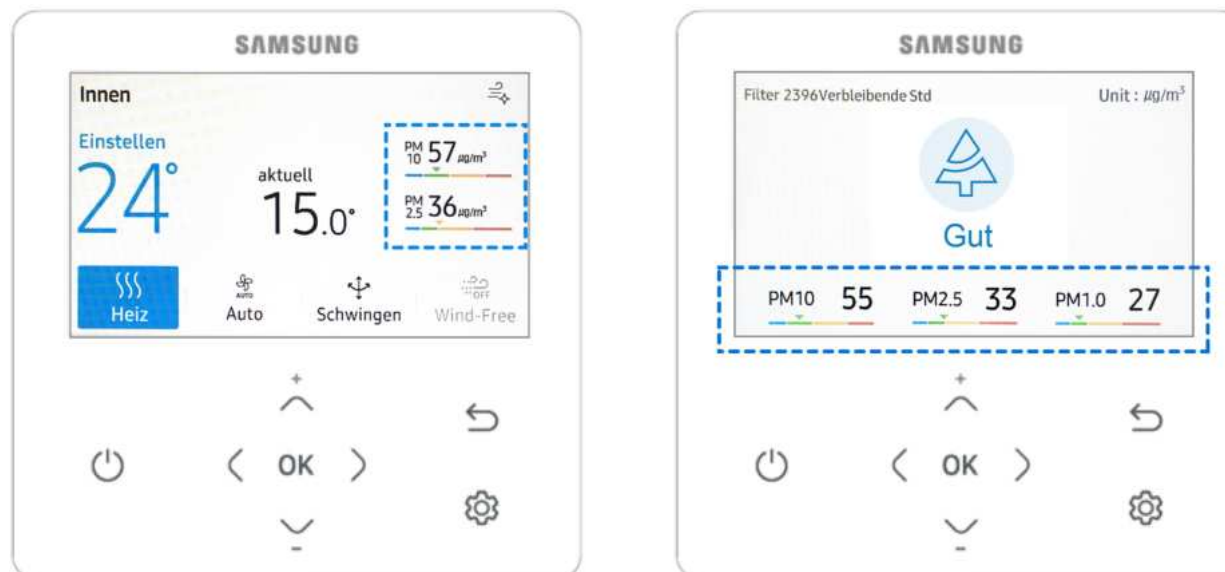
Bakterien und Viren wirksame 3 Stufen Raumluf Sterilisation für hygienische Raumluf mit dem Hygiene Paneel für Wind-Free™ 1-Weg Deckenkassetten

Weltneuheit, einfachste Bedienung und Visualisierung der Filterungseffizienz

Mit der Touch-Fernbedienung MWR-WG01JN ist es erstmals möglich, die Effizienz der ISO PM1 Sterilisation/Filterung live und in Echtzeit auf dem Display der Fernbedienung abzulesen. Die Effizienz der Filterung wird in μg (Mikrogramm) pro m^3 angezeigt. Mit der Samsung NASA-Bus-Kommunikation und Systemdigitalität wird die Erfordernis z.B. einer Filterreinigung erstmals online, in Echtzeit und in Effizienz angezeigt. Bei den Geräten unserer Marktbegleiter wird die Filterreinigung auf einer Fernbedienung nur in Betriebsstunden – und nicht nach Filtereffizienz angezeigt. In Konsequenz bedeutet dies, dass ein bereits verschmutzter Filter nicht angezeigt wird, wenn die festgesetzte Betriebszeit, z.B. 100-1000 Stunden noch nicht erreicht ist.

Die Visualisierung ist eine zukunftsweisende und tiefgreifende Innovation von Samsung für den Gesundheitsschutz.

Mit Beachtung der Filterreinigung ist der Betrieb von Samsung Wind-Free™ Raumlufklimageräten absolut unbedenklich.



SAMSUNG ELECTRONICS CO., LTD. TEST REPORT

SCOPE OF WORKS

STERILIZATION PERFORMANCE TEST OF FILTER SYSTEM(K-ELEMENTS)

REPORT NUMBER

RT20E-S0010-R

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TEST REPORT FOR SAMSUNG ELECTRONICS CO., LTD.

Report No.: RT20E-S0010-R

Date: APR. 17, 2020 (Revised)

OBJECTIVE

The purpose of the testing is:

To evaluate the sterilization performance of the microorganisms that are collected on the filter with electric field (such as Electrostatic Precipitator) as operating air purifier or air conditioner.

HYPOTHESIS

The K-element(Electrostatic Precipitator) of Samsung Electronics can sterilize the microorganisms that collected on the filter.(*Escherichia coli* : above 99%, *Staphylococcus aureus* : above 99%)

CONCLUSION

Based on the data collected, the Hypothesis is accepted:

The K-element(Electrostatic Precipitator) of Samsung Electronics can sterilize the microorganisms that collected on the filter.(*Escherichia coli* : above 99%, *Staphylococcus aureus* : above 99%)

The test is for information only, the data is supplied to the client without conclusion. Final evaluation to be conducted by the client.

Suyeon Park

ENGINEER

Bo Park

REVIEWER

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TEST REPORT FOR SAMSUNG ELECTRONICS CO., LTD.

Date: APR. 17, 2020

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**SECTION 2
OBJECTIVE**

The purpose of the testing is:

To evaluate the sterilization performance of the microorganisms that are collected on the filter with electric field (such as Electrostatic Precipitator) as operating air purifier or air conditioner.

Accuracy Needed 5 %

Accuracy and Repeatability should be determined from the multiple samples run as needed for the analysis conducted.

**SECTION 3
PARAMETERS**

The following parameters are controlled

VALUE	DESCRIPTION	UNITS	METHOD	MU
200	Volume measurement	μl	Pipette	± 0.2 μℓ (Approx. 95 %, k=2)
1000	Volume measurement	μl	Pipette	± 0.2 μℓ (Approx. 95 %, k=2)
25, 37	incubator	°C	THERMO METER	± 1.6 °C (Approx. 95 %, k=2)

The following parameters are monitored

VALUE	DESCRIPTION	UNITS	METHOD	MU
200	Volume measurement	μl	Pipette	± 0.2 μℓ (Approx. 95 %, k=2)
1000	Volume measurement	μl	Pipette	± 0.2 μℓ (Approx. 95 %, k=2)
25, 37	incubator	°C	THERMO METER	± 1.6 °C (Approx. 95 %, k=2)

SECTION 4 PRODUCT/MODEL DESCRIPTION

MODEL :

☐ FLOOR STANDING AIR CONDITIONER

AF***847**FN, AF***667**FN, AF***647**FN, AF***999**WN, AF***799**FN, AF***997**FN,
AF***797**FN, AF***777**FN, AF***X97**AN, AF***X95**AN, AF***X97**FN, AF***X77**FN, AF***797**SN,
AF***757**FN, AF***757**SN, AF***577**SN

☐ 4Way CST

AC***NN4PBH1*, AC***NN4DB**, AC***RN4PBH1*, AC***RN4DB**, AC***RN4FBH1*, AM***NN4DBH1*,
AC***JN4PBH1*, AC***JN4DB**, AC***E84*BC1, NS***4*XB1*, AM***N4DBH1*, ND***4HXB1*,
AC***KN4PBH*, AM***KN4PBH1, AM***NN4D**, AM***RN4D**, AM***TN4***, AM***AN4***,
AM***KN4P**, AM***KN4D**, AM***KN4S**

☐ 1Way CST

AC***RN1PBH1, AC***RN1DB*1, AJ**MB1PBC*, AM***N1*BH, AM***N1*EH*, AM***N1*CH*, AJ***B1*BC

SECTION 5 SAMPLE ACQUISITION

Sample(s) was supplied by the applicant:

SAMPLE #	DESCRIPTION	MODEL	PURCHASE LOCATION	DATE	CONDITION
1	Floor standing air conditioner	AF***797**FN	Prepared by Samsung	NOV. 11, 2016	Packaged and undamaged

SECTION 6 HYPOTHESIS

The K-element(Electrostatic Precipitator) of Samsung Electronics can sterilize the microorganisms that collected on the filter.(*Escherichia coli* : above 99%, *Staphylococcus aureus*: above 99%)

SECTION 7 EQUIPMENT LIST

EQUIPMENT	MANUFACTURER	MODEL NO.	CALIBRATION DATE	CALIBRATION DUE
INFRARED THERMO METER	TESTO	TESTO810	2016.01.04	2017.01.04
Pipet (200)	Eppendorf	200	2015.12.28	2016.12.28
Pipet (1000)	Eppendorf	1000	2015.12.28	2016.12.28

SECTION 8 TECHNICAL STAFF

#	Staff Name	Area of Expertise
1	Guensick Lee	Performance test (Dankook University)
2	Seonghwan Kim	Performance test (Dankook University)
3	Rody Ju	Chemical test / Intertek Testing Korea Ltd.
4	Roy Lee	Performance test / Intertek Testing Korea Ltd.
Note: Complete training records for staff are available upon request		

Testing was conducted at the laboratory mentioned below and all process were witnessed and reviewed by the technical staff mentioned above.

Dankook University (119, Dandae-ro, Dongnam-gu, Cheonan-si, Chungnam, 330-714, Korea)

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SECTION 9

TEST PROCEDURE

9.1 Test species of Microorganisms used in the test are as follows;

- Basic test (2 species): *Escherichia coli* and *Staphylococcus aureus*
- Optional test (2 species): *Micrococcus luteus* and *Aspergillus niger*

9.2 Preparation and preservation of medium and reagent

9.2.1 Preparation of medium and reagent

9.2.1.1 Luria Broth of medium and reagent:

- Casein enzymic hydrolysate : 10.0 g
- Yeast extract : 5.0 g
- Sodium chloride : 10.0 g
- Agar : 15.0 g
- Distilled water : 1000 mL

After putting the above reagents into a vessel, heat it up to dissolve them completely and keep pH in the range of (7.0 ± 0.2) under the temperature of 25 °C. Then, put the each dissolved sample of 200 mL into Erlenmeyer flasks of 500 mL in separate. For sterilization, place the flasks into autoclave for 15 mins, which keeps the steam pressure of 1,055 g/cm² and temperature of (121 ± 2) °C.

9.2.1.2 Potato dextrose agar medium⁽¹⁾ :

- Potato starch : 4.0 g
- Dextrose : 20 g
- Agar : 15.0 g
- Distilled water : 1000 mL

After putting the above reagents into a vessel, heat it up to dissolve them completely and keep pH in the range of (5.1 ± 0.2) under the temperature of 25 °C using 0.1 mol/L of HCl. Then, put the each dissolved sample of 200 mL into Erlenmeyer flasks of 500 mL in separate. For sterilization, place the flasks into autoclave for 15 mins, which keeps the steam pressure of 1,055 g/cm² and temperature of (121 ± 2) °C.

Ref(1) Potato dextrose agar medium can be obtained from BD Difco TM.

9.2.1.3 Phosphate buffed saline :

- Sodium chloride : 8.0 g
- Potassium chloride : 0.2 g
- Disodium phosphate : 1.44 g
- Monopotassium phosphate : 0.24 g
- Distilled water : 1000 mL

After putting the above reagents into a vessel, heat it up to dissolve them completely and keep pH in the range of (7.2 ± 0.2) under the temperature of 25 °C using HCl. For sterilizing, place the flasks into the autoclave for 15mins, which keeps the steam pressure of 1,055 g/cm² and temperature of (121 ± 2) °C.

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- 9.2.4 Preservation of medium and reagent : It is necessary to preserve medium and reagent, if not to be used immediately after compounding, in the temperature of (5~10) °C. In addition, do not use them if it has been longer than a month after compounding.

9.3 Culture and preservation of test species

- 9.3.1 Culture of test species : For Bacteria, the strain which has been preserved by using loop is inoculated onto Luria broth agar medium (2.1.1) and is cultivated for (2 ~ 3) days with air temperature of (37 ± 1) °C. For fungus, the preserved strain is transplanted onto the center of the potato dextrose agar medium (2.1.2) and is cultivated for (5 ~ 7) days with air temperature of (25 ± 1) °C

- 9.3.2 Preservation of test species : The strain is preserved on the slant media of the potato dextrose agar medium (2.1.1) with the temperature of 25 °C and the preserved strains have to be sub-cultured every 14 days.

Remark 1. For a consistent and precise test, the original strain of test species must be preserved appropriately to prevent against contamination and mutation. In order to prevent contamination, well-trained sterilization techniques are essential for culturing and transplanting. In order to prevent mutation, it is necessary to be very careful in the subculture every month and to observe the change of purity of each species periodically.

9.4 The method of examination

9.4.1 The inoculum preparation

- 9.4.2.1 Preculture of Inoculum : For bacteria, the preserved test species is inoculated onto LB broth after pouring the LB broth(Difco) of 25 mL into a tube of 50mL and is cultured for 18 hrs in shaking incubator at 37 °C. For fungus, the 100 µL of spore slurry that is made with spores from PDA plate is smeared on the potato dextrose agar and is cultured for (7 ~ 10) days at 25°C.

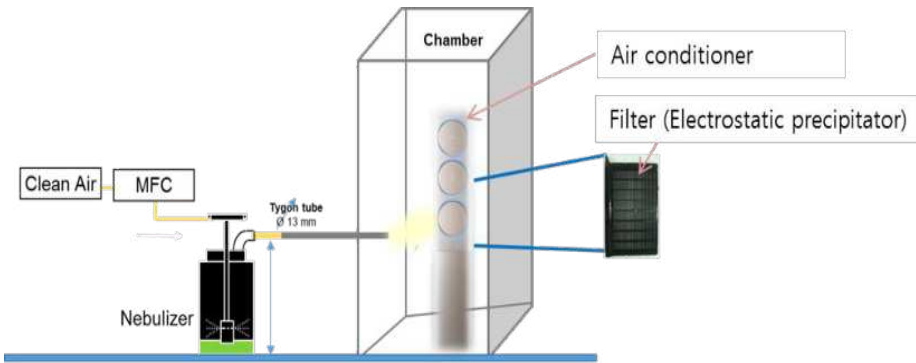
- 9.4.2.2 Preparation of Inoculum : Centrifuge the cultured bacteria at 6,000 rpm for 10 minutes after setting O.D value of spectrometer to 1.6 at 600 nm wavelength and transferring 20 mL of the cultured bacteria to another new 50 mL tube. Then, remove supernatant and prepare the inoculum by mixing 4 mL LB broth with 16 mL of sterile water. For the preparation of inoculum of fungus, make spore slurry by pouring 10 mL of PBS buffer onto PDA plate, where the spore is deposited on, and shaking it. Then, adjust the concentration of collected spore in the range between 1.0 X 10⁷ and 1.0 X 10⁸ spores/mL by using hemocytometer and prepare 20 mL of the inoculum.

- 9.4.2.3 1 ml of the solution from the tubes of each series is extracted with new sterilized pipettes and placed in two Petri dishes each. 15 ml to 20 ml of nutrient agar kept at 45 °C to 48 °C is added to each Petri dish; allow them to stand for 15 min at room temperature. When the agar medium solidifies, the Petri dishes are placed upside down and incubated for 40 h to 48 h at (37 ± 1) °C.

- 9.4.2 Microbial inoculum to test filter and operation of Air conditioner or Air purifier : The tests have to be conducted with each strain separately. The air conditioner or air purifier needs to operate at least one minute prior to injection of microbial. In the case of air conditioner, it should be operated with "Cleaning mode" and "Low fan speed"⁽²⁾. The prepared bacteria or spore slurry is generated at 4 LPM for 10 minutes by using Nebulizer. At the same time, air conditioner or air purifier is operating so that the airborne bacteria or fungus is captured on the surface of filter with electric field(electrostatic

precipitator) installed in air conditioner or air purifier. After generation of bacteria or fungus, turn off the Nebulizer and let the air conditioner or air purifier operated for additional 10 minutes for sterilization process.

Ref(2) The filter is operated under the condition of "Cleaning mode". When cleaning mode is selected, the filter operates with high voltage power. And then the filter collects particles or microorganisms. And it is necessary to operate "Low fan speed", so as to achieve the result of the lowest performance condition



9.4.3 Microbes detection : Disassemble the filter with electric field from air conditioner or air purifier and cut off the central area of the collector with size of (14 ~ 15) cm². Put the slice of collector into 10 mL of 1XPBS buffer and stir for 2 minutes.

9.4.4 Coefficient : Count the number of bacteria or fungus in the liquid obtained from 4.3 using hemocytometer and convert the number into the unit of cells/cm² for bacteria test or unit of spores/cm² for fungus test. In addition, dilute the liquid obtained from 4.3 to the order of 10⁻² or 10⁻³, smear the diluted liquid on the LB agar in case of bacteria and cultivate it for 3 days. In case of fungus, smear the diluted liquid on the potato dextrose agar, and cultivate it for 4 or 5 days. After cultivation, count the number of grown colony and convert into the unit of cfu/cm². After cultivating at (25 ± 1) °C for spores or at (37 ± 1) °C for the bacteria, count and record the number of colony after sorting petri dish of dilution factor which is in the range between 30 and 300 of viable cell colony.

9.5 Test Results

- 9.5.1 Criteria : The number of the bacteria or the fungal spores collected from the filter using electric fields has to be greater than or equal to 10,000 per 1 cm². The number of the colonies cultivated in the medium has to be less than the number counted with hemocytometer.
- 9.5.2 Sterilization Performance Calculation :

$$\text{Sterilization rate(\%)} = (\text{Ca} - \text{Cb}) / \text{Ca} \times 100$$

In here,
Ca = the number of the bacteria or the fungal spores counted with Hemocytometer
That is the total count of the germs which becomes extinct and germ

Cb = The number of colonies of the bacteria or fungal spores after cultivation on the medium. That is the total count of viable germs.

SECTION 10 TEST RESULT

Sample	Ca	Cb	Sterilization rate(%)
<i>Escherichia coli</i>	581000	2355	99.5
<i>Staphylococcus aureus</i>	811000	6111	99.3

SECTION 11 Conclusion

Based on the data collected the Hypothesis is accepted:

The K-element(Electrostatic Precipitator) of Samsung Electronics can sterilize the microorganisms that collected on the filter.(*Escherichia coli* : above 99%, *Staphylococcus aureus* : above 99%)

The test is for information only, the data is supplied to the client without conclusion. Final evaluation to be conducted by the client.

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APPEXDIX I. PHOTOS OF SAMPLEFLOOR STANDING AIR CONDITIONER
[AF***797**FN]

K-element (Electrostatic Precipitator)

< Pre filter >

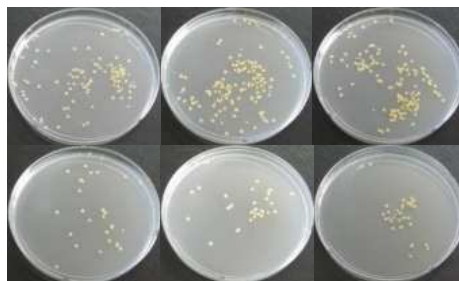
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REVISION HISTORY;

DATE	REPORT NO.	Revision Description	Revised By
04 NOV 2016	161100051SEL-001	Initial release	Rody Ju
17 APR 2020	RT20E-S0010-R	1. Changed the report number 2. Changed the report formation to the new template as well as the new company logo. 3. Added the model name on page 5.	Suyeon Park

APPEXDIX II. Colony morphologies of microorganisms after cultivation*Escherichia coli**Staphylococcus aureus*

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MTF Marken-Distributions GmbH
Niedersachsenstraße 12 | 48465 Schüttorf
Fon. +49 (0) 5923 988440 | Fax. +49 (0) 5923 98844999
Mail. mtf@mtf-online.net | Web. www.mtf-online.net

