

**Prüfbericht - Produkte**
*Test Report - Products*

<b>Prüfbericht-Nr.:</b> <i>Test report no.:</i>	<b>KR210JXF-001</b>	<b>Auftrags-Nr.:</b> <i>Order no.:</i>	<b>156140572 10</b>	Seite 1 von 8 Page 1 of 8
<b>Kunden-Referenz-Nr.:</b> <i>Client reference no.:</i>	<b>S.I. Jung</b>	<b>Auftragsdatum:</b> <i>Order date:</i>	2021-07-21	
<b>Auftraggeber:</b> <i>Client:</i>	LG Electronics Inc. 84, Wanam-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, 51554, Rep. of Korea			
<b>Prüfgegenstand:</b> <i>Test item:</i>	Residential ERV(Energy recovery ventilation)			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type no.:</i>	Z-H0150B2SR, Z-H0200B2SR, Z-H0300B2SR, Z-H0300B2SR (Refer to page 2)			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	Performance test			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	Proposed test method			
<b>Wareneingangsdatum:</b> <i>Date of sample receipt:</i>	2021-07-21			
<b>Prüfmuster-Nr.:</b> <i>Test sample no.:</i>	#1			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	2021-08-09 - 2021-08-20			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	Busan			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	Pukyong National University Institute of Food Science 45 Yongso-ro, Nam-gu, Busan 48513, Korea			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Refer to the test result.			
<b>geprüft von:</b> <i>tested by:</i>	<b>genehmigt von:</b> <i>authorized by:</i>			
<b>Datum:</b> <i>Date:</i>	2021-09-09	<b>Ausstellungsdatum:</b> <i>Issue date:</i>	2021-09-09	
	Sang-Min Kim		Jang-Sup Lee	
<b>Stellung / Position:</b>	Sachverständige(r)/Expert	<b>Stellung / Position:</b>	Sachverständige(r)/Expert	
<b>Sonstiges /</b> <i>Other:</i>				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legend:	P(ass) = passed a.m. test	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
<b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b> <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

V05

## 1. Task

Sterilization performance verification of the built-in UV LED for the pre-filter in the residential ERV according to the proposed test specification.

## 2. Description of sample

The model, Z-H0150B2SR, is the energy recovery ventilation unit for household use.

The unfavorable model, Z-H0200B2SR, has been tested as representative under proposed test condition.

Model, Z-H0200B2SR, is identical to model, Z-H0150B2SR, except for the model name according to the higher rated air flow rate.

Models, Z-H0250B2SR and Z-H0300B2SR, are identical to model, Z-H0150B2SR, except for the fan motor and model name according to the higher rated air flow rates.

The built-in UV LEDs for the sterilization is mounted in front of the pre-filter and has specification below.

### Specification of UV LED Module

Manufacturer	Type name	Specification		
		Forward Voltage	Peak Wave Length	Radiant Flux
BEACOIN I&C	BCL-448AA BCL-438BA	DC 5.5 V	Max. 280 nm Min. 265 nm	3.5 mW

## 3. Test condition

### 3.1 Electrical supply

Item	Value
Test voltage	220 V, 60 Hz
Commercial electrical supply used.	

### 3.2 Ambient temperature

Item	Value
Dry-bulb (°C)	(25 ± 2) °C
RH (%)	(50 ± 10) %

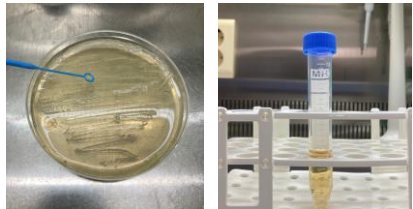


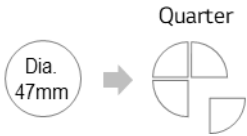
## 4. Test specification

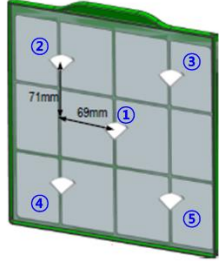


### 4.1 Bacteria

No	Type	Strain Number <sup>*)</sup>
1	<i>Staphylococcus aureus</i>	ATCC 6538P
2	<i>Staphylococcus epidermidis</i>	ATCC 12228
3	<i>Klebsiella pneumoniae</i>	ATCC 4352

<sup>\*)</sup> ATCC: American Type Culture Collection

### 4.2 Procedure

Step	Description	Photo
1	Pre-culture each bacteria	
2	Prepare Soybean casein digest broth with lecithin and polyoxyethylene sorbitan monooleate (SCDLP)	
3	Inoculate bacteria solution on membrane filter with vacuum pump. - Bacteria is filtered with membrane filter (Mixed Cellulose Ester, Dia. 47 mm, 0.22 µm pore size). - Divide a filter by 4 parts.	 [ Membrane Filter Size ] 

Step	Description	Photo
4	<p>Attach 5 parts of the filter on the surface of pre-filter with double-sided tape.</p> <p>Other 5 parts of the filter shall be left on the petri dish under the ambient temperature during the proposed operation period as control group.</p>	
5	<p>Operate the ventilation unit at energy recovery mode (Summer+Winter) and fan speed, low, through the controller.</p> <p>Then, operate UV LED function for 2 hours.</p>	-
6	<p>After the operation period, recover the bacteria from specimens with SCDLP solution.</p>	
7	<p>Determine the viable bacteria count by the pour plate culture method of all specimens.</p>	
8	<p>Repeat the test.</p>	-
9	<p>Calculate the bacterial sterilization efficiency rate (%)</p> $= \{1-(M_e/M_c)\} \times 100$ <ul style="list-style-type: none"> <li>- M<sub>e</sub>: Number of colonies (Test group)</li> <li>- M<sub>c</sub>: Number of colonies (Control group)</li> </ul>	-

## 5. Test result

### 5.1 *Staphylococcus aureus*

Sampling Point	Test Run	Control Group (CFU/mL)		Test Group (CFU/mL)	Sterilization Efficiency Rate (%)	
		Individual	Average		Individual	Average
①	1 <sup>st</sup>	1.0 x 10 <sup>6</sup>	1.6 x 10 <sup>6</sup>	1	> 99.999	> 99.999
	2 <sup>nd</sup>	2.2 x 10 <sup>6</sup>		7	> 99.999	
②	1 <sup>st</sup>	8.9 x 10 <sup>5</sup>	1.0 x 10 <sup>6</sup>	0	> 99.999	> 99.999
	2 <sup>nd</sup>	1.2 x 10 <sup>6</sup>		2	> 99.999	
③	1 <sup>st</sup>	8.7 x 10 <sup>5</sup>	9.9 x 10 <sup>5</sup>	0	> 99.999	> 99.999
	2 <sup>nd</sup>	1.1 x 10 <sup>6</sup>		0	> 99.999	
④	1 <sup>st</sup>	1.4 x 10 <sup>6</sup>	1.5 x 10 <sup>6</sup>	0	> 99.999	> 99.999
	2 <sup>nd</sup>	1.6 x 10 <sup>6</sup>		0	> 99.999	
⑤	1 <sup>st</sup>	1.2 x 10 <sup>6</sup>	1.2 x 10 <sup>6</sup>	0	> 99.999	> 99.999
	2 <sup>nd</sup>	1.1 x 10 <sup>6</sup>		2	> 99.999	

➔ Sterilization Efficiency Rate: > 99.99 %

### 5.2 *Staphylococcus epidermidis*

Sampling Point	Test Run	Control Group (CFU/mL)		Test Group (CFU/mL)	Sterilization Efficiency Rate (%)	
		Individual	Average		Individual	Average
①	1 <sup>st</sup>	1.3 x 10 <sup>6</sup>	1.6 x 10 <sup>6</sup>	14	> 99.999	99.998
	2 <sup>nd</sup>	1.8 x 10 <sup>6</sup>		29	99.998	
②	1 <sup>st</sup>	1.1 x 10 <sup>6</sup>	1.3 x 10 <sup>6</sup>	6	> 99.999	> 99.999
	2 <sup>nd</sup>	1.5 x 10 <sup>6</sup>		5	> 99.999	
③	1 <sup>st</sup>	1.4 x 10 <sup>6</sup>	1.3 x 10 <sup>6</sup>	2	> 99.999	> 99.999
	2 <sup>nd</sup>	1.1 x 10 <sup>6</sup>		0	> 99.999	
④	1 <sup>st</sup>	1.4 x 10 <sup>6</sup>	1.4 x 10 <sup>6</sup>	2	> 99.999	> 99.999
	2 <sup>nd</sup>	1.4 x 10 <sup>6</sup>		2	> 99.999	
⑤	1 <sup>st</sup>	1.2 x 10 <sup>6</sup>	1.2 x 10 <sup>6</sup>	5	> 99.999	> 99.999
	2 <sup>nd</sup>	1.1 x 10 <sup>6</sup>		4	> 99.999	

➔ Sterilization Efficiency Rate: > 99.99 %

5.3 *Klebsiella pneumoniae*

Sampling Point	Test Run	Control Group (CFU/mL)		Test Group (CFU/mL)	Sterilization Efficiency Rate (%)	
		Individual	Average		Individual	Average
①	1 <sup>st</sup>	1.5 x 10 <sup>6</sup>	1.3 x 10 <sup>6</sup>	5	> 99.999	> 99.999
	2 <sup>nd</sup>	1.1 x 10 <sup>6</sup>		11	> 99.999	
②	1 <sup>st</sup>	1.1 x 10 <sup>6</sup>	1.2 x 10 <sup>6</sup>	0	> 99.999	> 99.999
	2 <sup>nd</sup>	1.3 x 10 <sup>6</sup>		0	> 99.999	
③	1 <sup>st</sup>	8.3 x 10 <sup>5</sup>	8.9 x 10 <sup>5</sup>	0	> 99.999	> 99.999
	2 <sup>nd</sup>	9.5 x 10 <sup>5</sup>		0	> 99.999	
④	1 <sup>st</sup>	9.8 x 10 <sup>5</sup>	1.1 x 10 <sup>6</sup>	0	> 99.999	> 99.999
	2 <sup>nd</sup>	1.3 x 10 <sup>6</sup>		0	> 99.999	
⑤	1 <sup>st</sup>	1.3 x 10 <sup>6</sup>	1.2 x 10 <sup>6</sup>	0	> 99.999	> 99.999
	2 <sup>nd</sup>	1.1 x 10 <sup>6</sup>		0	> 99.999	

➔ Sterilization Efficiency Rate: > 99.99 %

6. Conclusion

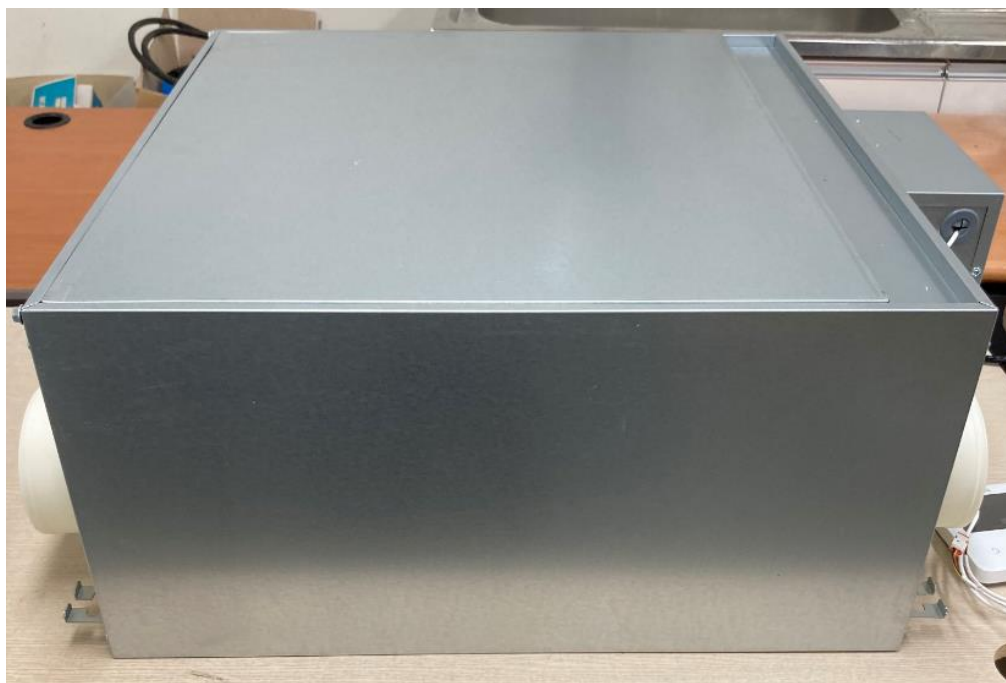
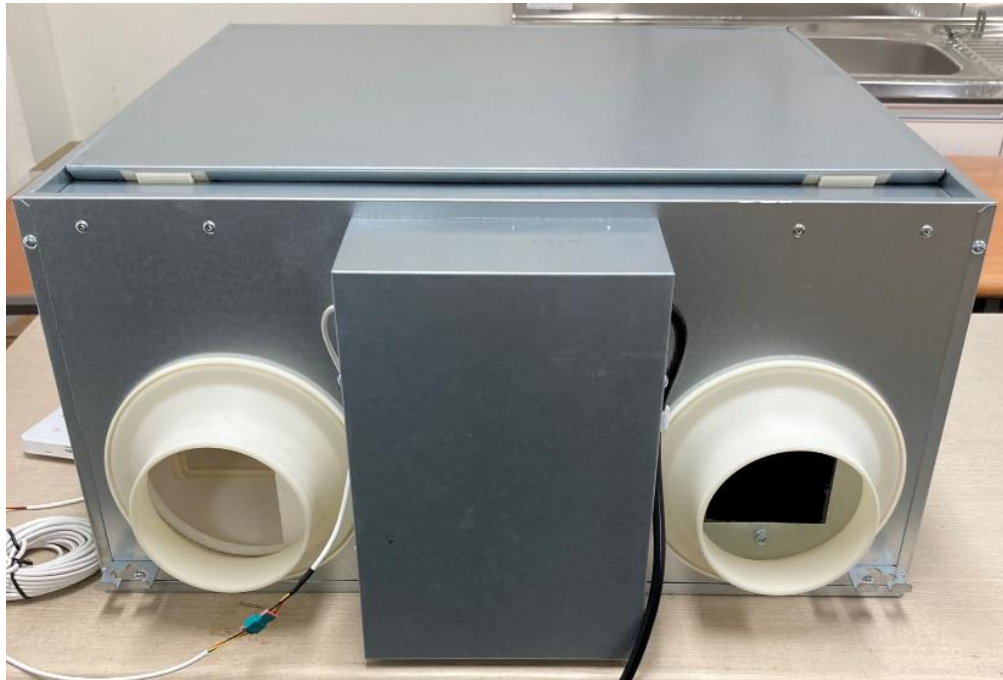
The built-in UV LED module of tested model, Z-H0150B2SR, has over 99.99 % sterilization performance on average to bacteria on the membran filters of the pre-filter under the proposed test condition.

Sterilization Efficiency Rate		
<i>Staphylococcus aureus</i>	<i>Staphylococcus epidermidis</i>	<i>Klebsiella pneumoniae</i>
> 99.99 %	> 99.99 %	> 99.99 %

This result would be different at practical usage condition and environment of the residential ERV.

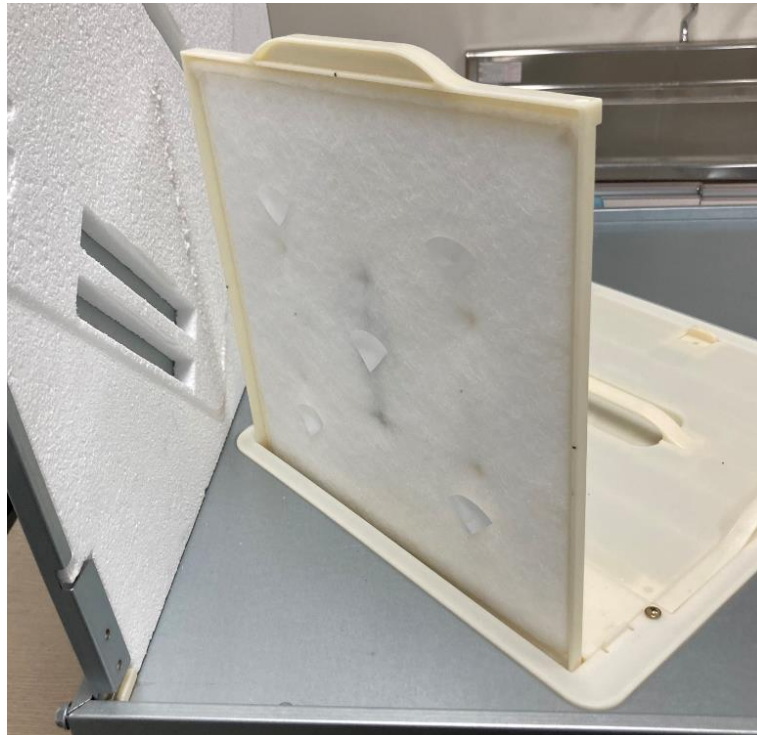
**Appendix. Photo**

Z-H0150B2SR

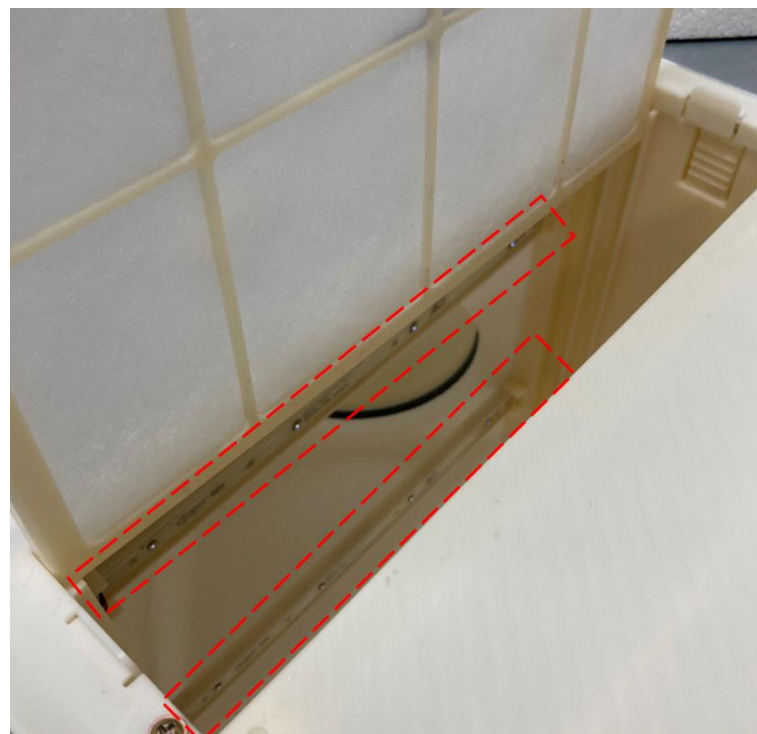




Pre-filter



UV LED Modules



**END OF TEST REPORT**