


Prüfbericht - Produkte
Test Report - Products

Prüfbericht-Nr.: <i>Test report no.:</i>	KR21Q1Y7-001	Auftrags-Nr.: <i>Order no.:</i>	156140601 10	Seite 1 von 8 Page 1 of 8
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	S.I. Jung	Auftragsdatum: <i>Order date:</i>	2021-07-21	
Auftraggeber: <i>Client:</i>	LG Electronics Inc. 84, Wanam-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, 51554, Rep. of Korea			
Prüfgegenstand: <i>Test item:</i>	Residential ERV(Energy recovery ventilation)			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	Z-H0150B2SR, Z-H0200B2SR, Z-H0300B2SR, Z-H0300B2SR (Refer to page 2)			
Auftrags-Inhalt: <i>Order content:</i>	Performance test			
Prüfgrundlage: <i>Test specification:</i>	Proposed test method			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2021-08-09			
Prüfmuster-Nr.: <i>Test sample no.:</i>	#1			
Prüfzeitraum: <i>Testing period:</i>	2021-08-13 - 2021-08-20			
Ort der Prüfung: <i>Place of testing:</i>	Busan			
Prüflaboratorium: <i>Testing laboratory:</i>	Pukyong National University Institute of Food Science 45 Yongso-ro, Nam-gu, Busan 48513, Korea			
Prüfergebnis*: <i>Test result*:</i>	Refer to the test result.			
geprüft von: <i>tested by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i> 2021-09-09	Sang-Min Kim		Ausstellungsdatum: <i>Issue date:</i> 2021-09-09	Jang-Sup Lee
Stellung / Position:	Sachverständige(r)/Expert		Stellung / Position:	Sachverständige(r)/Expert
Sonstiges / <i>Other:</i>				
Zustand des Prüfgegenstandes bei Anlieferung: <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				
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. <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 module 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

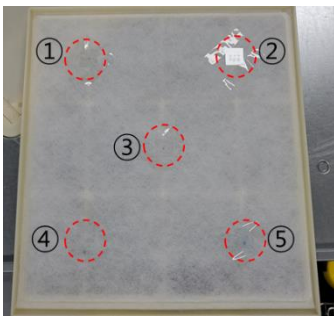
Item	Value
Dry-bulb (°C)	(25 ± 2) °C
RH (%)	(50 ± 10) %

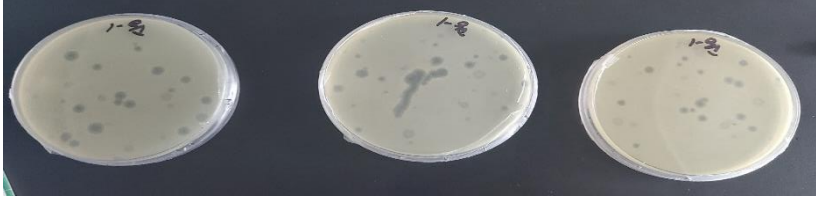
4. Test specification

4.1 Virus and Bacteria

Item	Type	Strain Number ^{*)}
Virus	Phi X 174	ATCC 13706-B1
Host	<i>Escherichia coli C</i>	ATCC 13706
*) ATCC: American Type Culture Collection		

4.2 Procedure

Step	Description
1	<p>Preparation of the virus, Phi X 174.</p> <ul style="list-style-type: none"> - Culture the host, <i>Escherichia coli C</i>, with Nutrient Broth(NB) at (37 ± 1) °C for 18 h to 24 h. - Prepare 1.5 % agar plate (Tryptic Soy Agar) and 0.7 % soft agar (Tryptic Soy Agar). - Make 0.2 % host solution with the soft agar. And pour 2.5 mL solution into the agar plate. - Pour 0.5 mL high concentration virus solution into soft agar plate and culture at (37 ± 1) °C for 18 h to 24 h. - Scrape off lysate of the soft agar. And centrifuge it for 20 minutes after adding (2.5 ~ 3.0) mL Soybean casein digest broth with lecithin and polyoxyethylene sorbitan monooleate (SCDLP). - Extract the virus solution with a membrane filter (0.2 µm) and store it in the freezer at -75 °C before use.
2	<p>Inoculate 10 µL virus solution having concentration ($10^8 \sim 10^9$) PFU on the cover glass (size: 20 mm x 20 mm) as specimen. And dry it for 30 minutes in the clean bench.</p>
3	<p>Attached the 5 specimens as test group on pre-filter with tape. A specimen shall be left on the petri dish under the ambient temperature during the proposed operation period as control group.</p> 

Step	Description								
4	<p>Operate the indoor unit at energy recovery mode (Summer+Winter) and fan speed, low, through the controller.</p> <p>UV LED operates as below sequence and duration.</p> <table border="1" data-bbox="368 521 1034 629"> <tr> <td data-bbox="368 521 635 577">UV LED Light</td> <td data-bbox="635 521 767 577">On</td> <td data-bbox="767 521 900 577">Off</td> <td data-bbox="900 521 1034 577">On</td> </tr> <tr> <td data-bbox="368 577 635 629">Irradiation Logic</td> <td data-bbox="635 577 767 629">2 h</td> <td data-bbox="767 577 900 629">0.5 h</td> <td data-bbox="900 577 1034 629">2 h</td> </tr> </table>	UV LED Light	On	Off	On	Irradiation Logic	2 h	0.5 h	2 h
UV LED Light	On	Off	On						
Irradiation Logic	2 h	0.5 h	2 h						
5	<p>After the operation period, detach each specimen, cover glass only.</p> <p>Put it into 50 mL conical tube with 5 mL SCDLP solution. Then, recover the virus by voltexing for 10 s at least.</p>								
6	<p>Determine the viable virus count by the plaque assay method.</p> 								
7	<p>Repeat the test.</p>								
8	<p>Calculate the virus sterilization efficiency rate (%)</p> $= \{1 - (M_e / M_c)\} \times 100$ <ul style="list-style-type: none"> - M_e: Number of plaques (Test group) - M_c: Number of plaques (Control group) 								

5. Test result

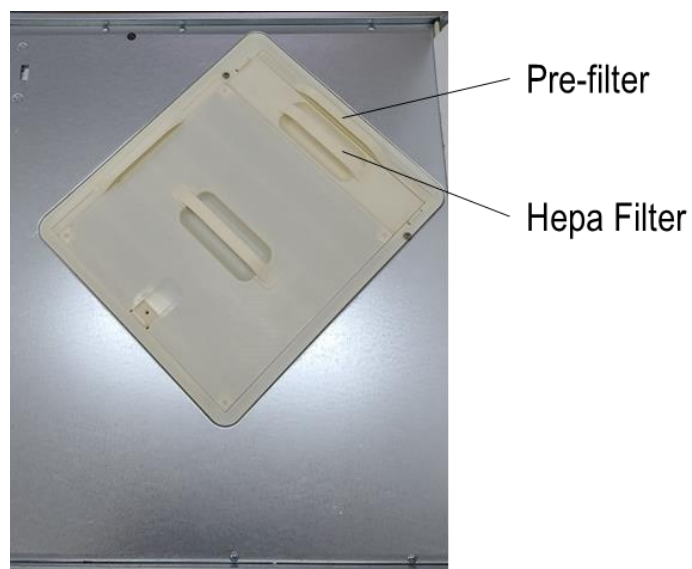
The built-in UV LED module of tested model, Z-H0150B2SR, has 99.99 % sterilization performance to virus, Phi X 174, on the cover glass of the pre-filter under the proposed test condition.

Sampling Point	Test Run	Control Group (PFU/cover glass)	Test Group (PFU/cover glass)	Sterilization Efficiency Rate (%)	
				Individual	Average
①	1 st	4.20 x 10 ⁸	1.00 x 10 ²	99.99	99.99
	2 nd	6.17 x 10 ⁸	4.80 x 10 ¹	99.99	
	3 rd	6.23 x 10 ⁸	6.67 x 10 ¹	99.99	
②	1 st	4.20 x 10 ⁸	8.00 x 10 ¹	99.99	99.99
	2 nd	6.17 x 10 ⁸	5.06 x 10 ¹	99.99	
	3 rd	6.23 x 10 ⁸	1.00 x 10 ¹	99.99	
③	1 st	4.20 x 10 ⁸	9.00 x 10 ³	99.99	99.99
	2 nd	6.17 x 10 ⁸	7.93 x 10 ³	99.99	
	3 rd	6.23 x 10 ⁸	6.87 x 10 ³	99.99	
④	1 st	4.20 x 10 ⁸	2.00 x 10 ¹	99.99	99.99
	2 nd	6.17 x 10 ⁸	5.20 x 10 ¹	99.99	
	3 rd	6.23 x 10 ⁸	1.08 x 10 ¹	99.99	
⑤	1 st	4.20 x 10 ⁸	2.00 x 10 ¹	99.99	99.99
	2 nd	6.17 x 10 ⁸	3.67 x 10 ¹	99.99	
	3 rd	6.23 x 10 ⁸	1.73 x 10 ¹	99.99	

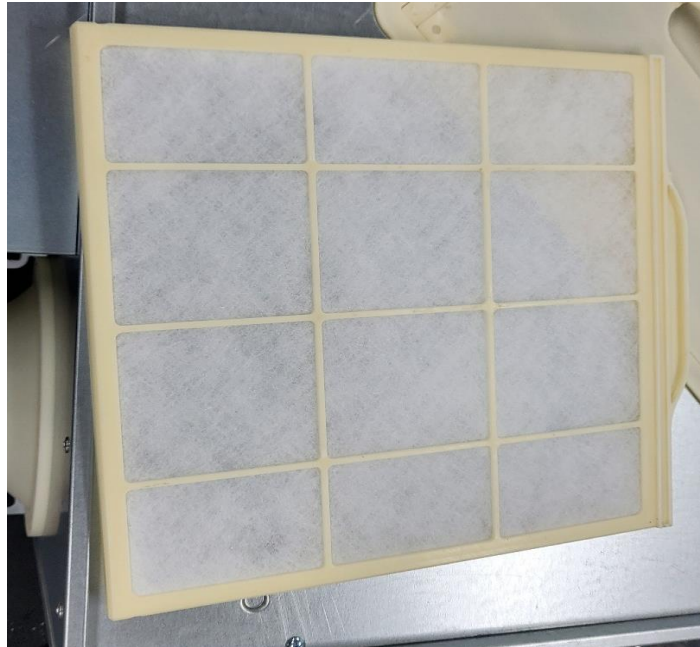
This result would be different at practical usage condition and environment of the residential ERV.

Appendix. Photo

Z-H0150B2SR



Pre-filter



UV LED Modules



END OF TEST REPORT