LG ELECTRONICS INC.

TEST REPORT

SCOPE OF WORKS
EVALUATION OF STERILIZATION EFFICIENCY OF ANTIBACTERIAL (스팀통살균) CYCLE IN DRYER

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TEST REPORT FOR LG ELECTRONICS INC.

Report No.: RT21E-S0054
Date: SEP. 17, 2021

OBJECTIVE

The purpose of the testing is:

To evaluate the antibacterial efficacy of 스팀통살균 cycle from the components of the dryer.

HYPOTHESIS

스팀통살균 cycle will remove more than 99.9 % of the bacteria in the components of the dryer.

CONCLUSION

Based on the data collected, the Hypothesis is accepted:

스팀통살균 cycle can remove more than 99.9 % of the bacteria in the components of the dryer.

Rody Ju		Bo Park	
ENGINEER		**Laboratory Director**	

CONDUCTED AT	LG ELECTRONICS INC.
WITNESSED AT	INTERTEK TESTING SERVICES KOREA LTD.
PERIOD OF TEST	13 SEP 2021 ~ 17 SEP 2021
DATE OF ISSUE	17 SEP 2021

SECTION 1
INDEX

SECTION 2
OBJECTIVE

The purpose of the testing is:

To evaluate the antibacterial efficacy of 스팀통살균 cycle from the components of the dryer.

SECTION 3
PARAMETERS

The following parameters are controlled

VALUE	DESCRIPTION	UNITS	METHOD
25 ± 3	Test room temperature	°C	Data logger
40 ± 10	Test room humidity	% R.H.	Data logger
35-37	Incubated Temperature	°C	Data logger

The following parameters are monitored

VALUE	DESCRIPTION	UNITS	METHOD
25 ± 3	Test room temperature	°C	Data logger
40 ± 10	Test room humidity	% R.H.	Data logger
35-37	Incubated Temperature	°C	Data logger

SECTION 4
PRODUCT/MODEL DESCRIPTION

PRODUCT INFORMATION: LG Dryer

MODEL: RD20****, W20****

Note:

SECTION 5
SAMPLE ACQUISITION

Samples prepared by LG Electronics Co., Ltd.:

SAMPLE #	DESCRIPTION	SERIAL No.	PURCHASE LOCATION	DATE	CONDITION
1	LG Dryer	106KWEL98724	Prepared by LG	2021.07	Packaged and undamaged

SECTION 6
HYPOTHESIS

스팀통살균 cycle will remove more than 99.9 % of the bacteria in the components of the dryer.

SECTION 7
TECHNICAL STAFF

#	Staff Name	Area of Expertise
1	Younsu Joo	Chemical test engineer / LG Electronics
2	Rody Ju	Technical Manager / Intertek Testing Korea Ltd.
3	Bo Park	Laboratory Director / Intertek Testing Korea Ltd.
Note: Complete training records for staff are available upon request		

Testing was conducted at:
LG Electronics Gasan R&D Campus
51, Gasan digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea
LG Electronics Co., Ltd.

Witnessed by:
Intertek Testing Services Korea Ltd.
4/F, A-JU Digital Tower, 7, Achasan-ro 5 –gil, Seongdong-gu, Seoul, Korea

SECTION 8
TEST PROCEDURE

1. Test Set up :

Items		Requirement	Condition
Electrical Supply	Voltage	(220 ± 10)	(220 ± 10)
	Frequency	(60 ± 10) Hz	(60 ± 10) Hz
Ambient Temperature		(25 ± 3) °C	(25 ± 3) °C
Ambient humidity		(40 ± 10) % R.H.	(40 ± 10) % R.H.

2. Test materials

2.1 The following bacteria shall be used in the testing:

Staphylococcus aureus ATCC 6538
Escherichia coli ATCC 8739
Pseudomonas aeruginosa ATCC 27853
Klebsiella pneumoniae ATCC 4352

3. Test method

3.1 The test organism shall be resuspended in 50 ml of Tryptic Soy broth and incubated for 24 hr at 35 °C.

3.2 The test organism is serially diluted to the target concentration 10^6~ 10^8 CFU/ml using the PBS (Phosphate Buffered saline).

3.3 200 µl of diluted organism is inoculated into the carriers.

- Carrier size: 5 X 5 cm

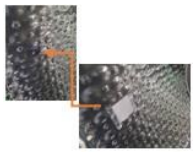
3.4 Two of each test carriers from **3.3** will be used as controls.

3.5 Attach the carriers

- test carriers are attached to filter, eva (front), condenser (front), drum-air hole(back), inside the drum, drum lifter, Heat moving path(entrance), Heat moving path (exit), Interior Door, Filter (Bottom), Eva (Bottom)

- The fan attached bacteria using a cotton swab.

position of attach

Filter	Eva (Front)	Condenser (Front)	Drum-air Hole (back)	Inside the drum	Drum lifter
					
Heat moving path (entrance)	**Heat moving path (exit)**	**Interior Door**	**Filter (Bottom)**	**Eva (Bottom)**	**Fan**
					

3.6 Start 스팀통살균 cycle with electrical supply 220 V, 60 Hz.

3.7 After the 스팀통살균 cycle ends, each carrier will be aseptically removed and put into the 10 ml of PBS and vortex 1 minute.

3.8 Ten-fold serial dilution will be prepared from the eluting solution and plated onto an appropriate recovery agar (or 3M Petri film).

Strain	recovery agar
Staphylococcus aureus	Staph Express Count Plate (3M Petrifilm)
Escherichia coli	E. coli/Coliform Count Plate (3M Petrifilm)
Pseudomonas aeruginosa	Cetrimide Agar Base (Pseudomonas Isolation Agar)
Klebsiella pneumoniae	Sorbitol MacConkey Agar

3.9 All plates incubated for 24 ~ 48 hr at 35 °C.

3.10 Three repeat test be completed.

3.11 Evaluated the data as below Calculation.

Percent reduction = [(a-b)/a] x 100

Where: a = geometric mean of the number of organisms surviving on the untreated control carriers (cfu/ml)
b = geometric mean of the number of organisms surviving on the test carriers (cfu/ml)
** According to the 3M petrifilm guide, the preferable counting range on a Petrifilm Aerobic count plate is 10-300 colonies.*

SECTION 9
TEST RESULT

< Staphylococcus aureus >

Sample name	Test 1 (CFU/ml)	% Reduction	Test 2 (CFU/ml)	% Reduction	Test 3 (CFU/ml)	% Reduction
Control	2.7×10^7	-	2.4×10^7	-	3.5×10^7	-
Filter	1.0×10^2	**>99.99**	0	**>99.99**	0	**>99.99**
Eva (Front)	1.1×10^4	**99.9**	0	**>99.99**	0	**>99.99**
Condenser (Front)	8.0×10^2	**99.99**	1.2×10^4	**99.9**	1.2×10^3	**99.99**
Drum-air Hole (back)	7.0×10^1	**>99.99**	0	**>99.99**	0	**>99.99**
Inside the drum	7.9×10^2	**99.99**	1.6×10^4	**99.9**	0	**>99.99**
Drum lifter	1.9×10^2	**>99.99**	1.0×10^1	**>99.99**	0	**>99.99**
Heat moving path (entrance)	1.0×10^1	**>99.99**	0	**>99.99**	0	**>99.99**
Heat moving path (exit)	4.2×10^2	**99.99**	0	**>99.99**	0	**>99.99**
Interior Door	1.3×10^2	**>99.99**	1.0×10^4	**99.9**	0	**>99.99**
Filter (Bottom)	3.8×10^3	**99.9**	0	**>99.99**	0	**>99.99**
Eva (Bottom)	0	**>99.99**	0	**>99.99**	4.3×10^2	**99.99**

Sample name	Test 1 (CFU/ml)	% Reduction	Test 2 (CFU/ml)	% Reduction	Test 3 (CFU/ml)	% Reduction
Control	8.0×10^7	-	5.0×10^7	-	3.8×10^7	-
Fan	0	**>99.99**	0	**>99.99**	0	**>99.99**

< Escherichia coli >

Sample name	Test 1 (CFU/ml)	% Reduction	Test 2 (CFU/ml)	% Reduction	Test 3 (CFU/ml)	% Reduction
Control	2.6×10^7	-	2.0×10^8	-	2.1×10^8	-
Filter	0	**>99.99**	0	**>99.99**	0	**>99.99**
Eva (Front)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Condenser (Front)	0	**>99.99**	3.3×10^3	**99.99**	1.0×10^1	**>99.99**
Drum-air Hole (back)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Inside the drum	0	**>99.99**	2.0×10^3	**>99.99**	0	**>99.99**
Drum lifter	0	**>99.99**	0	**>99.99**	0	**>99.99**
Heat moving path (entrance)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Heat moving path (exit)	0	**>99.99**	1.0×10^1	**>99.99**	0	**>99.99**
Interior Door	0	**>99.99**	1.8×10^2	**>99.99**	0	**>99.99**
Filter (Bottom)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Eva (Bottom)	1.0×10^1	**>99.99**	0	**>99.99**	0	**>99.99**

Sample name	Test 1 (CFU/ml)	% Reduction	Test 2 (CFU/ml)	% Reduction	Test 3 (CFU/ml)	% Reduction
Control	1.8×10^8	-	6.3×10^8	-	1.2×10^8	-
Fan	0	**>99.99**	0	**>99.99**	0	**>99.99**

< Pseudomonas aeruginosa >

Sample name	Test 1 (CFU/ml)	% Reduction	Test 2 (CFU/ml)	% Reduction	Test 3 (CFU/ml)	% Reduction
Control	1.0×10^6	-	4.0×10^5	-	5.0×10^5	-
Filter	0	**>99.99**	0	**>99.99**	0	**>99.99**
Eva (Front)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Condenser (Front)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Drum-air Hole (back)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Inside the drum	0	**>99.99**	0	**>99.99**	0	**>99.99**
Drum lifter	0	**>99.99**	0	**>99.99**	0	**>99.99**
Heat moving path (entrance)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Heat moving path (exit)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Interior Door	0	**>99.99**	0	**>99.99**	0	**>99.99**
Filter (Bottom)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Eva (Bottom)	0	**>99.99**	0	**>99.99**	0	**>99.99**

Sample name	Test 1 (CFU/ml)	% Reduction	Test 2 (CFU/ml)	% Reduction	Test 3 (CFU/ml)	% Reduction
Control	7.7×10^6	-	2.5×10^7	-	1.3×10^7	-
Fan	0	**>99.99**	0	**>99.99**	0	**>99.99**

< Klebsiella pneumoniae >

Sample name	Test 1 (CFU/ml)	% Reduction	Test 2 (CFU/ml)	% Reduction	Test 3 (CFU/ml)	% Reduction
Control	2.6×10^6	-	3.5×10^7	-	1.2×10^7	-
Filter	0	**>99.99**	0	**>99.99**	0	**>99.99**
Eva (Front)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Condenser (Front)	0	**>99.99**	3.6×10^3	**99.9**	0	**>99.99**
Drum-air Hole (back)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Inside the drum	0	**>99.99**	1.9×10^3	**99.99**	0	**>99.99**
Drum lifter	0	**>99.99**	0	**>99.99**	0	**>99.99**
Heat moving path (entrance)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Heat moving path (exit)	0	**>99.99**	0	**>99.99**	0	**>99.99**
Interior Door	0	**>99.99**	2.5×10^2	**>99.99**	0	**>99.99**
Filter (Bottom)	2.0×10^1	**>99.99**	0	**>99.99**	0	**>99.99**
Eva (Bottom)	0	**>99.99**	0	**>99.99**	0	**>99.99**

Sample name	Test 1 (CFU/ml)	% Reduction	Test 2 (CFU/ml)	% Reduction	Test 3 (CFU/ml)	% Reduction
Control	1.7×10^7	-	8.0×10^7	-	2.0×10^7	-
Fan	0	**>99.99**	0	**>99.99**	0	**>99.99**

SECTION 10
CONCLUSION

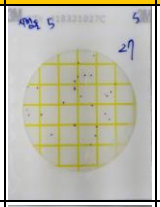
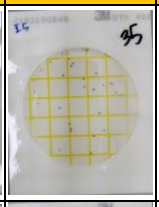
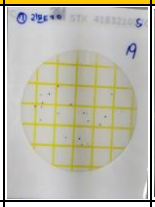
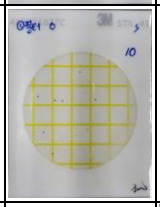
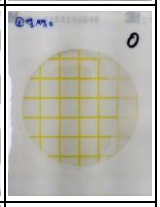
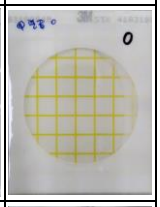
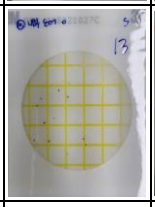
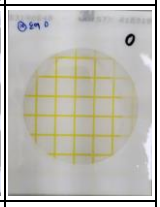
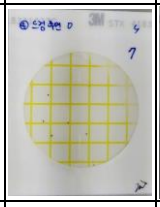
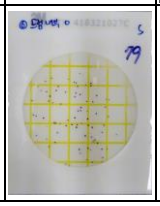
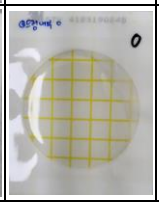
Based on the data collected the Hypothesis is accepted:

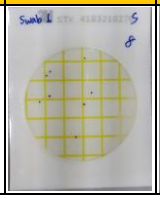
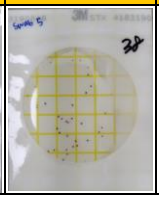
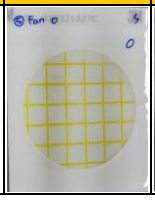
스팀통살균 cycle can remove more than 99.9 % of the bacteria in the components of the dryer.

APPENDIX I. Photos of sample

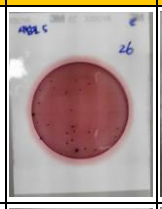
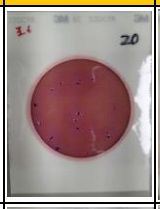
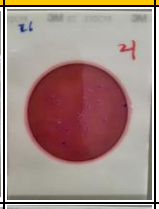
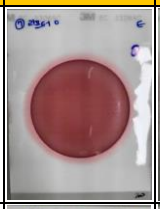
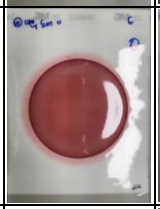
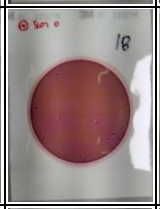
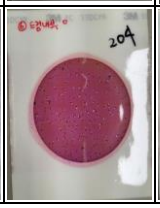
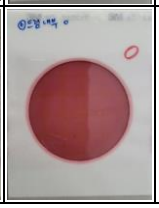
Appendix II. Photos of result

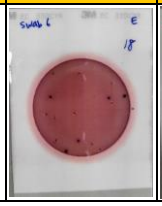
< Staphylococcus aureus >

Sample name	Test 1	Test 2	Test 3	Sample name	Test 1	Test 2	Test 3
Control				Drum lifter			
Filter				Heat moving path (entrance)			
Eva (Front)				Heat moving path (exit)			
Condenser (Front)				Interior Door			
Drum-air Hole (back)				Filter (Bottom)			
Inside the drum				Eva (Bottom)			

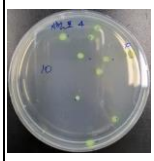
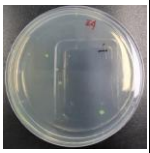
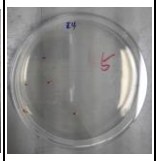
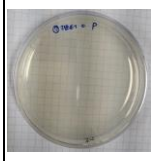
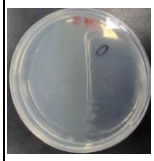
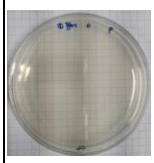
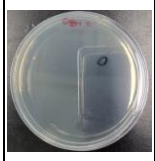
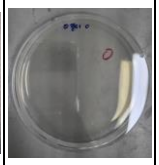
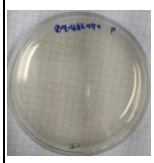
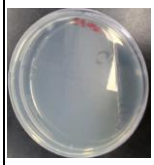
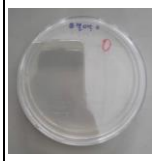
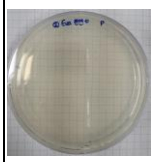
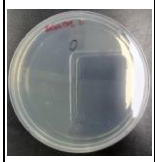
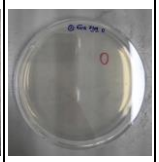
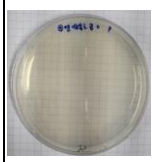
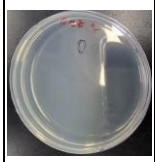
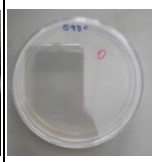
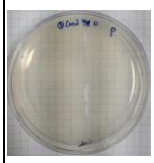
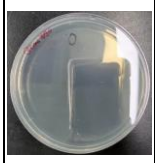
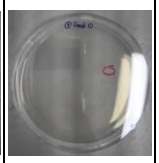
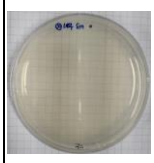
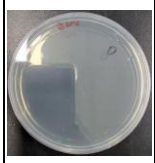
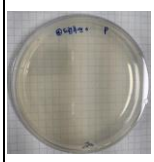
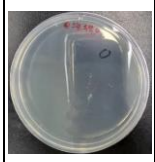
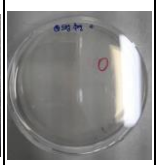
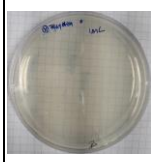
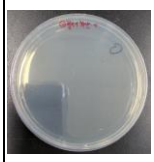
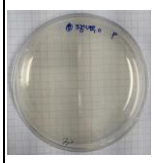
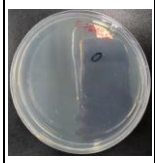
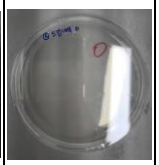
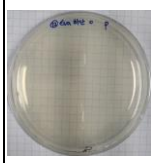
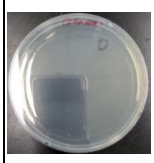
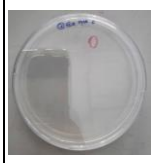
Sample name	Test 1	Test 2	Test 3	Sample name	Test 1	Test 2	Test 3
Control				Fan			

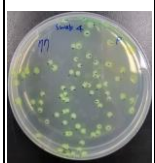
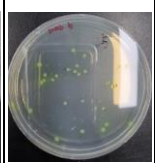
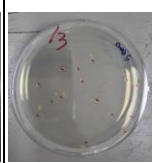
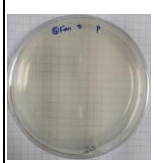
< Escherichia coli >

Sample name	Test 1	Test 2	Test 3	Sample name	Test 1	Test 2	Test 3
Control				Drum lifter			
Filter				Heat moving path (entrance)			
Eva (Front)				Heat moving path (exit)			
Condenser (Front)				Interior Door			
Drum-air Hole (back)				Filter (Bottom)			
Inside the drum				Eva (Bottom)			

Sample name	Test 1	Test 2	Test 3	Sample name	Test 1	Test 2	Test 3
Control				Fan			

< Pseudomonas aeruginosa >

Sample name	Test 1	Test 2	Test 3	Sample name	Test 1	Test 2	Test 3
Control				Drum lifter			
Filter				Heat moving path (entrance)			
Eva (Front)				Heat moving path (exit)			
Condenser (Front)				Interior Door			
Drum-air Hole (back)				Filter (Bottom)			
Inside the drum				Eva (Bottom)			

Sample name	Test 1	Test 2	Test 3	Sample name	Test 1	Test 2	Test 3
Control				Fan			

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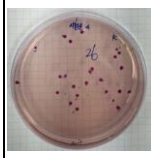
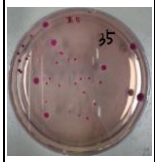
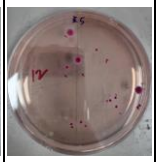
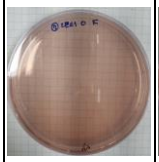
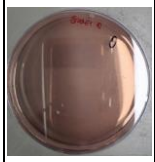
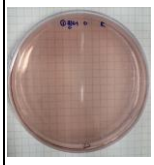
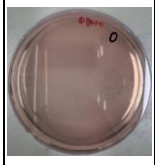
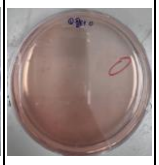
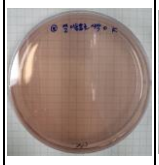
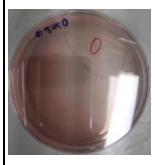
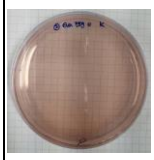
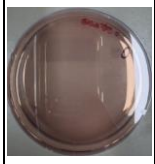
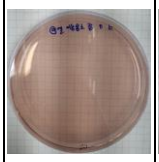
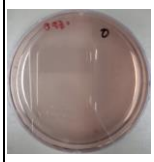
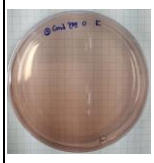
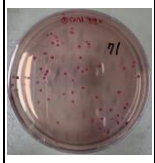
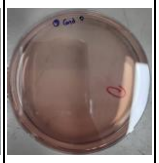
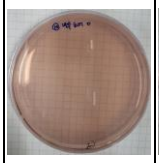
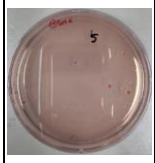
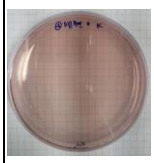
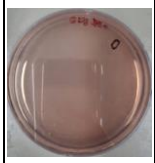
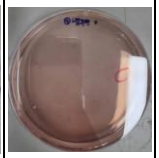
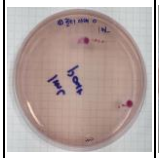
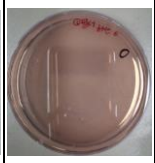
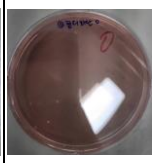
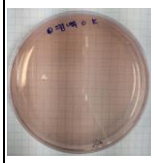
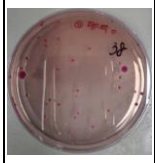
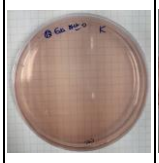
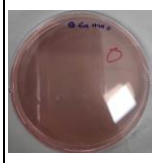
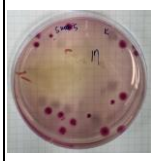
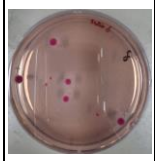
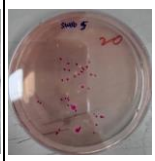
Sample name	Test 1	Test 2	Test 3	Sample name	Test 1	Test 2	Test 3
Control				Drum lifter			
Filter				Heat moving path (entrance)			
Eva (Front)				Heat moving path (exit)			
Condenser (Front)				Interior Door			
Drum-air Hole (back)				Filter (Bottom)			
Inside the drum				Eva (Bottom)			

Sample name	Test 1	Test 2	Test 3	Sample name	Test 1	Test 2	Test 3
Control				Fan