



## PERFORMANCE TESTING LETTER REPORT

Dimer, LLC  
434 S. San Vicente Blvd.  
Los Angeles, CA  
USA, 90048

Standard (s): Final Test Plan developed by QAI/Nemko and Dimer, LLC

Subject: Nemko USA Performance Testing of UVHammer, per quote 18JE110701

Model(s): UVHammer

To Whom it May Concern:

This letter report represents the results of our performance testing of the above noted model to the testing plan stated above. All measurements were made with calibrated test equipment. See the following pages for the test results.

**Safety Conclusion: The UVHammer operator receives no detectable UVC exposure to any body part behind the Impervious Polycarbonate Shield and device operation requires the operator to remain behind the shield.**

Performance Conclusions: The UVHammer delivers a minimum of:

24 mJ/cm<sup>2</sup> UVC to the top of a horizontal surface, including floors, at a speed of 100-120\* ft/min(<5 seconds for a 7 foot OR table),

24 mJ/cm<sup>2</sup> UVC to a vertical surface, including curtains, at a speed of 130-150\* ft/min(<10 seconds for BOTH sides of a 10 foot curtain),

16 mJ/cm<sup>2</sup> UVC to the under-surface of a horizontal surface at a speed of 40-60\* ft/min,

24 mJ/cm<sup>2</sup> UVC to the floor simultaneously when room contents (e.g. furnishings, curtains, etc.) are being treated,

\*UVC delivery is (inversely) proportional to the speed of the UVHammer as displayed by the control panel speedometer.

35 mJ/cm<sup>2</sup> UVC to a toilet seat in 3 seconds,

29 mJ/cm<sup>2</sup> UVC to a wash basin in 3 seconds, and greater UVC exposure to the valve handle.

Performance UVC exposures including the floor, bed, both sides of a curtain, bathroom wash basin and toilet seat are achieved in less than 3 minutes.

This letter-report completes Nemko Project No. RJ6731. All information regarding this project will remain on file with Nemko.

**TESTING:**

<b>LIMITED TESTING PERFORMED</b>			
Test Number	Test	Remarks / Results	Performed (Y/N)
1	Operator Exposure	Testing behind shield	Y
2	UVC Delivery	--	Y
3	Complete Path Timed Test	--	Y
Supplementary Information: Test Location: Rancho Cucamonga, CA			

<b>TEST EQUIPMENT LIST</b>			
Item	Equipment Type	QAI Asset No.	Next Cal. Due
1	Ambient	RE0002	2019-05-24
2	Stopwatch	RE0087	2019-03-07
3	Tape Measure	RE0012	2019-10-19
Equipment Provided by Client.			
4	ILT800-CUV	00052	2019-11-08
5	Solarmeter Digital UV Meter	00872	ICO
Supplementary Information: VBU (Verify Before Use), ICO (Initial Calibration Only)			

<b>EQUIPMENT UNDER TEST LIST</b>					
Item	Equipment Type	Make	Model No.	Serial No.	Sample No.
A	UVHammer	Dimer, LLC	0027527	00407	1

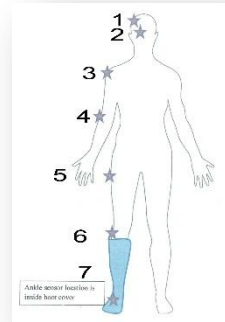
<b>TEST INFORMATION</b>				
Tested by:	Test Date:	Ambient Temperature, °C	Ambient Humidity, %	Ambient Pressure, hPa
Luis Padilla	2018-12-19	25.7	36.7	977.7

## TEST RESULTS

### OPERATOR EXPOSURE (Test 1)

Method:

Measure UVC exposure inside the Impervious Polycarbonate Shield to determine whether the operator is exposed to UVC during UVHammer operation



Test Set-up and Procedure:

Test at multiple locations behind the UVC impervious polycarbonate shield.

Results:

Test Number	0	1	2	3	4	5	6	7
Location	1 Meter	Forehead ~(5'5")	Eye Level ~(5'3")	Shoulder ~(4'8")	Elbow ~(3'2")	Hip ~(2'10")	Knee ~(1'11")	Ankle (Boot Cover) ~(0'4")
<b>Test 1: Wing Horizontal @ Max Height</b>								
--	000	000	000	000	000	000	000	000
<b>Test 2: Wing Horizontal @ Mid Height</b>								
--	000	000	000	000	000	000	000	000
<b>Test 3: Wing Horizontal @ Low Height</b>								
--	000	000	000	000	000	000	000	000
Supplementary Information: Measurements made in $\mu\text{J}/\text{cm}^2$								

Part Under Test	Comments
UVHammer	<p>The positive pressure power switch on the handle requires the operator to remain behind the Impervious Polycarbonate Shield to activate UVC delivery.</p> <p>Ankle exposure measurement was taken with the UVC meter inside the boot cover.</p>

**Safety Conclusion:** The UVHammer operator receives no detectable UVC exposure to any body part behind the Impervious Polycarbonate Shield and device operation requires the operator to remain behind the shield.

## TEST RESULTS

### UVC DELIVERY (Test 2)

Method:

Verify the UVHammer will deliver UVC doses consistent with effective disinfection on various surfaces and angles with pre-determined speed of UVHammer travel.

Test Set-up and Procedure:

Target surfaces: 20" wide horizontal table (top and bottom), vertical target surface, and floors.

Results:

Speed	100-120 ft/Min		
Location	Table (Top)		
Position	Near	Middle	Far
Trial 1	29.6	24.4	33.8
Trial 2	26.9	26.7	25.5
Trial 3	28.4	24.4	26.0
		AVR	27.3

Speed	40-60 ft/Min		
Location	Table (Bottom)		
Position	Near	Middle	Far
Trial 1	15.6	--	16.4
Trial 2	20.9	--	17.2
Trial 3	11.6	--	16.6
		AVR	16.4

Speed	130-150 ft/Min		
Location	Curtain		
Position	Near	Middle	Far
Trial 1	24.1	21.1	30.7
Trial 2	29.4	22.6	31.5
Trial 3	28.1	26.3	25.2
		AVR	26.6

Speed	100-120 ft/Min		
Location	Floor		
Position	Near	Middle	Far
Trial 1	23.1	25.1	24.6
Trial 2	27.1	21.6	21.9
Trial 3	24.9	24.3	29.0
		AVR	24.6

Part Under Test	Comments
UVHammer	All measurements are expressed as mJ/cm <sup>2</sup> . Measurements were conducted with lamps about 2 inches from target surface/UVC meter.

**Performance Conclusions: The UVHammer delivers a minimum:**

**24 mJ/cm<sup>2</sup> UVC** to the top of a horizontal surface, including floors, at a speed of 100-120\* ft/min, (<5 seconds for a 7 foot OR table)

**24 mJ/cm<sup>2</sup> UVC** to a vertical surface, including curtains, at a speed of 130-150\* ft/min, (<10 seconds for BOTH sides of a 10 foot curtain)

**16 mJ/cm<sup>2</sup> UVC** to the under-surface of a horizontal surface at a speed of 40-60\* ft/min,

**24 mJ/cm<sup>2</sup> UVC** to the floor simultaneously when room contents (e.g. furnishings, curtains, etc.) are being treated.

\*UVC delivery is (inversely) proportional to the speed of the UVHammer as displayed by the control panel speedometer.

**Method:**

Verify the UVHammer will deliver UVC doses consistent with effective disinfection on toilet and wash basin in 3 seconds(each).

**Test Set-up and Procedure:**

The UVC meter was placed on a toilet seat and the UVHammer was positioned over the toilet seat and powered on for 3 seconds. The UVC meter was placed at the drain cover of the wash basin and the UVHammer was positioned over the wash basin and powered on for 3 seconds.

Exposure Time	3 seconds		
Location	<b>Toilet Seat</b>		
Position	~2 Inches above Toilet Seat		
Trial 1	32.2	--	--
Trial 2	39.1	--	--
Trial 3	37.7	--	--
	AVR	36.3	

Exposure Time	3 seconds		
Location	<b>Bathroom wash basin at drain cover</b>		
Position	~2 Inches above Sink Valve		
Trial 1	35.0	--	--
Trial 2	26.9	--	--
Trial 3	27.2	--	--
	AVR	29.7	

Part Under Test	Comments
UVHammer	All measurements are expressed as mJ/cm <sup>2</sup> . Measurements were conducted with lamps about 2 inches from target surface/UVC meter.

The valve handle is closer to the lamps and receives a greater UVC dose

**Performance Conclusions: The UVHammer delivers a minimum:**

**35 mJ/cm<sup>2</sup> UVC to a toilet seat in 3 seconds,**

**29 mJ/cm<sup>2</sup> UVC to a wash basin in 3 seconds, and greater UVC exposure to the valve handle,**

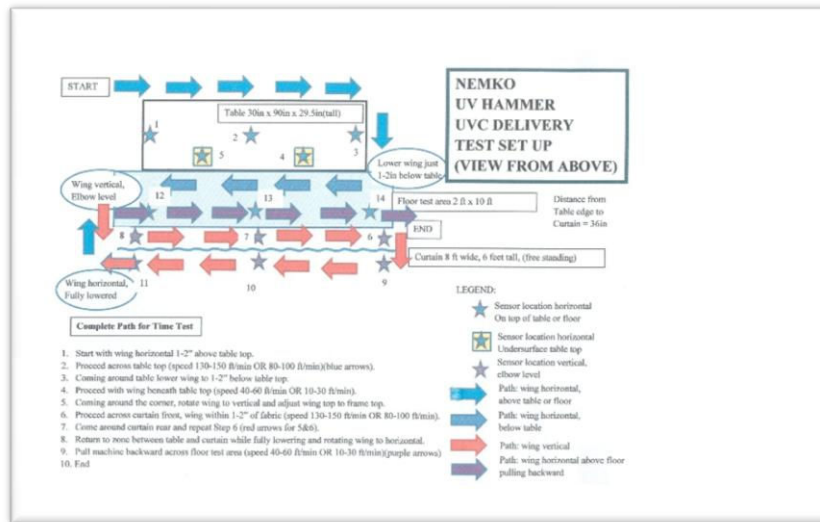
## TEST RESULTS

### COMPLETE PATH TIMED TEST (Test 3)

Method:

The UVHammer design is a radical departure from traditional UV applications. Verify the claim that a facility can reduce whole room UV treatment times 90% compared to earlier UV systems. Determine treatment time for sum of simulated patient room/bathroom surfaces including floors, bed, curtain, wash basin and toilet seat.

Test Set-up and Procedure:



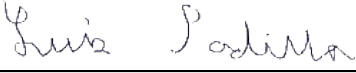
Performance UVC exposures including the floor, bed, both sides of a curtain, bathroom wash basin and toilet seat are achieved in less than 3 minutes.


Results:

Part Under Test	Comments	Verdict
UVHammer	UVHammer was moved across the room to clean multiple horizontal, vertical surfaces at multiple heights, angles and disinfected at various speeds	UVHammer was able to disinfected in five different positions in a time of 2:21 minutes

Performance UVC exposures including the floor, bed, both sides of a curtain, bathroom wash basin and toilet seat are achieved in less than 3 minutes.

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Test Engineer:	Luis Padilla Electrical Test Engineer	
	Typed Name	Signature
Bachelors of Science Electrical Engineering		

Reviewed by:	Igor Duspara Technical Manager - Electrical	
	Typed Name	Signature
Bachelors of Science Electrical Engineering		

If you have any questions, please contact:

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