UNDERSTANDING THE SCIENCE BEHIND THE FOOTWEAR SANITIZING STATION: RISK AND BENEFITS

CLASSIFICATION:

- The PathO_3Gen Solutions™ Footwear Sanitizing Solutions is designed and certified by an NRTL (Nationally Recognized Testing Laboratory) third party agency for safe use according to the requirements of UL Safety Standard 61010-1, 3rd Edition, May 11, 2012, Revised April 29 2016, CAN/CSA-C22.2 No. 61010-1-12, 3rd Edition, Revision dated April 29 2016
- Classified as Laboratory Equipment for Use In Health Care Applications; UL File No. E502456
- Report issued January 30, 2019; 231 pages in total
- Software is approved to UL1998; Standard for Software in Programmable Components
- Features a Lock-Out Board that monitors the ballast output and shuts down the device when the unit is stepped off of.

PATHO3GEN SOLUTIONS

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RATINGS:

- Electrical Ratings: AC Power Input: 120V~, 60 Hz, 1.0 AMP Maximum Load
- IPX1 Water Ingress Rating (Protected against vertically falling water drops)
- The PathO_3Gen Solutions™ Footwear Sanitizing Station is designed to support up to 400 lbs.

WARNING STATEMENTS

- UV emitted from this lamp. Skin or eye injury could result. Avoid exposure of eyes and skin to unshielded lamp.
- Ensure that the PathO_3Gen Solutions Footwear Sanitizing Station is used in a ventilated area. Avoid prolonged exposure.

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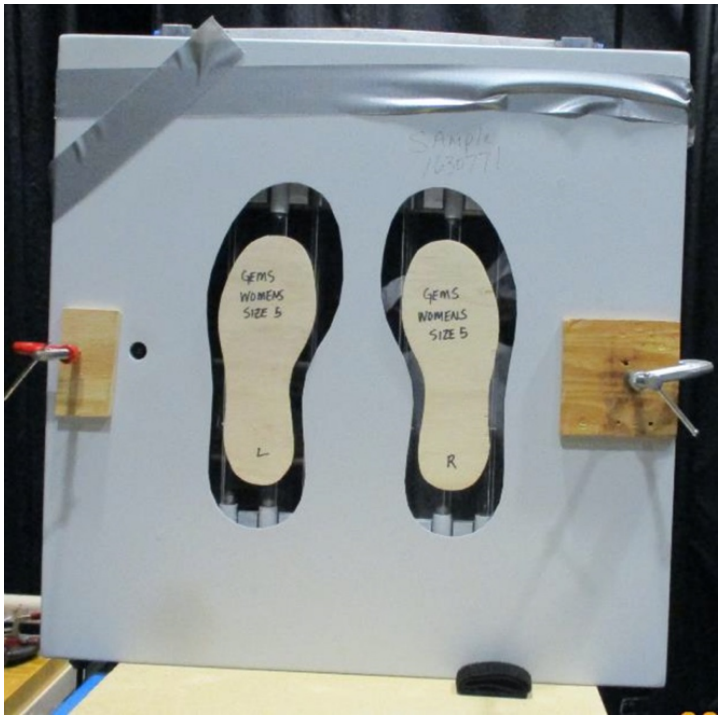
UV OUTPUT TESTING

The product was tested according to the following Standards:

- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) Ultraviolet Radiation; Table 2, Permissible Ultraviolet Exposures. Edition Year: 2017.
- IEC 62471 PHOTOBIOLOGICAL SAFETY OF LAMPS AND LAMP SYSTEMS; 2006-07

PATHO$_3$GEN SOLUTIONS FOOTWEAR SANITIZING STATION WITH MASK (WOMEN'S SIZE 5)



PATHO$_3$GEN SOLUTIONS FOOTWEAR SANITIZING STATION WITH MASK (WOMEN'S SIZE 5); UV SCAN

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TABLE 1 – UV OUTPUT RESULTS

MEASUREMENT DISTANCE [1]	*EFFECTIVE IRRADIANCE AT MEASUREMENT DISTANCE*	*PET - PERMISSIBLE EXPOSURE TIME AT MEASUREMENT DISTANCE [2]*	PEL (PERMISSIBLE EXPOSURE LIMIT) *CALCULATED DISTANCE WHERE EFFECTIVE IRRADIANCE IS*		
			0.1 µW/cm² *8 hrs. PET*	*0.3 µW/cm²* *3 hrs. PET*	*3.0 µW/cm²* *17.8 mins. PET*
150.0 mm / 5.90”	17.79 µW/cm²	168.6 Seconds (21 Cycles at 8 Sec)	2000.69 mm 78.77” / 6.56’	1155.10 mm 48.48” / 3.79’	365.27 mm 14.38” / 1.20’
152.4 mm / 6.00”	17.23 µW/cm²	174.1 Seconds (22 Cycles at 8 Sec)	2000.69 mm 78.77” / 6.56’	1155.10 mm 48.48” / 3.79’	365.27 mm 14.38” / 1.20’
304.8 mm / 12.00”	4.309 µW/cm²	696.3 Seconds (87 Cycles at 8 Sec)	2000.69 mm 78.77” / 6.56’	1155.10 mm 48.48” / 3.79’	365.27 mm 14.38” / 1.20’
457.2 mm /18.00”	1.915 µW/cm²	1,567.0 Seconds (196 Cycles at 8 Sec)	2000.69 mm 78.77” / 6.56’	1155.10 mm 48.48” / 3.79’	365.27 mm 14.38” / 1.20’

- The end-product test sample supplied for this investigation was assessed in the worst-case configuration possible. The test sample was also configured to emit radiation in pulsed mode at the maximum emissions current to represent the worst-case emissions.

1. Unit tested fully assembled with mask (Women’s Size 5 Shoe) on at noted measurement distance
2. PET - Acceptable exposure time for the UV radiation measured at the measurement distance.

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TABLE 2 – DISTANCES REQUIRED AT DIFFERENT PERIODS OF TIME

UNIT / BULB OUTPUT	*EFFECTIVE IRRADIANCE [1]*	*TIME*	*DISTANCE*
FULL POWER / WORST CASE - 60Hz, 100% duty cycle	2,040.00 µW/cm^2	4 Seconds	14 mm / 0.55”
FULL POWER / WORST CASE - 60Hz, 100% duty cycle	1,560.00 µW/cm^2	6 Seconds	16 mm / 0.63”
FULL POWER / WORST CASE - 60Hz, 100% duty cycle	908.00 µW/cm^2	8 Seconds	21 mm / 0.82”
STANDBY / IDLE; 60Hz, 4% duty cycle	.100 µW/cm^2	28,800 Seconds (8 Hrs.)	565 mm / 22.24”

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OZONE OUTPUT TESTING

- The unit was placed in an Ozone Chamber, which had volume of 10 ft^3 (very small; approximately twice the size of the unit). The chamber was sealed to ensure that air or ozone could not escape. The ozone chamber allowed for hand activation of the device. The product was activated, and ozone values were recorded every 10 seconds.

OZONE CHAMBER WITH DEVICE

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OZONE OUTPUT TESTING

- Using the test data collected, a determination was made as to how many product activations it takes to reach the OSHA 8-hour exposure limit (low to medium workload) of 0.1 ppm for ozone concentration given varying room dimensions.
- OSHA Exposure Limits:

DURATION	***LIMIT***	***NOTES***
15 MINS	0.3 PPM	STEL (SHORT TERM EXPOSURE LIMIT)
2 HRS	0.2 PPM	
8 HRS / 40 HRS PER WEEK	0.1 PPM	PEL (PERMISSIBLE EXPOSURE LIMIT)

- Ozone has a relatively short half-life; therefore, the expectation is that there will be a point in the testing where the amount of ozone being produced will be equal to the amount of ozone that is vanishing, i.e. turning back into oxygen.
- Factoring in the ozone half-life, room dimensions, airflow and air cycles/exchanges in the room, the total number of product activations is calculated in compliance with the OSHA exposure limit.
- Installation Calculator takes all of these factors into consideration.

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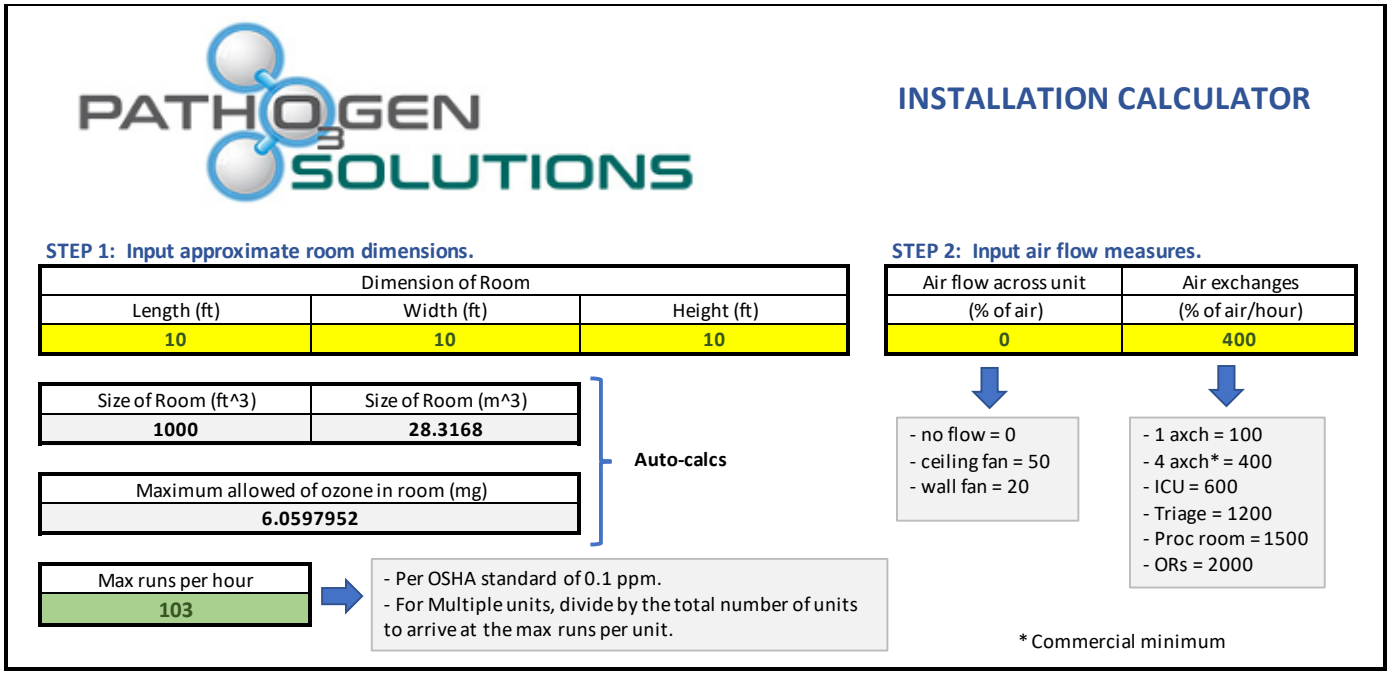
- **AIR CHANGES PER HOUR (ACH):**
  - 4 ACH is the minimum air change rate for any commercial or industrial building
  - Operating Rooms; 20ACH
  - Emergency Dept Waiting Rooms; 12 ACH
  - Exam / Treatment / Patient Rooms; 6 ACH
  - CDC (Centers for Disease Control and Prevention) Ventilation Specifications for Health-Care Facilities
  - https://www.cdc.gov/infectioncontrol/guidelines/environmental/appendix/air.html#tableb2



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