

Study Title

Spectral Irradiance Measurement of UV-C Wand

Purpose: To measure the irradiance of the test device and calculate the UV dose and exposure time

Sample received on: 15 September 2020

Condition of product: Received in excellent condition

Date of experiments: 22 September 2020

Sample type: UV-C system (Wand)- Model-SES-UVCHS2

Sender: Sarin Energy

Wavelength of interest (nm): 253.7 ± 10 nm (germicidal)

Method: Internal SOP for quantifying Irradiance and power measurements

Summary:

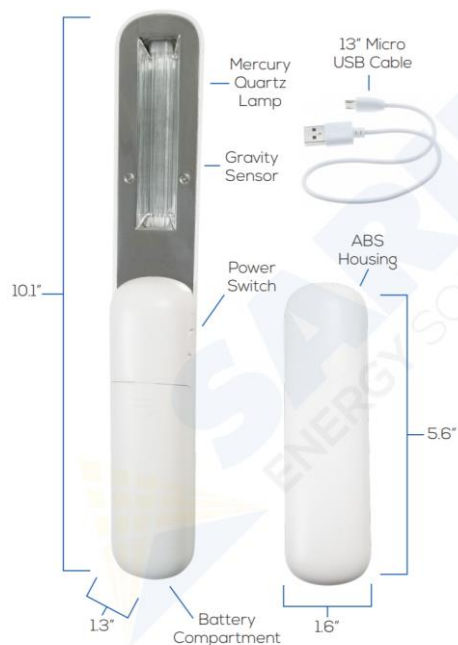


Figure 1. UV-C Wand

Using the oceans optic spectrometer, irradiance measurements were conducted on UV-C wand [Figure 1]. Spectrometer is equipped with an irradiance probe – a solarization-resistant optical fiber with Spectralon cosine corrector of 180 degrees field of view, coupled to its end –. Spectralon is a Lambertian diffuse material with a higher than 95% reflectance in the 220 to 400 nm range. Spectral irradiance of the lamp was measured using an optical fibre, set about 5.5 cm and 9 cm from the device. This system is calibrated with NIST-traceable Deuterium (D2) and Quartz-Tungsten-Halogen (QTH) calibration sources with approximately 5% and 3% uncertainties. A warm up time of 20 mins is a prerequisite for any optical measurement. All measurements were done in triplicate and data was averaged [Figure 2]. At a distance of 5.5 cm, irradiance value of 0.304 mW/cm^2 was observed. In contrast, irradiance of 0.14 mW/cm^2 was observed at a distance of 9 cm. Irradiance was relatively stable. Based on the irradiance of 0.304 mW/cm^2 (5 cm) and 0.14 mW/cm^2 (9 cm),

exposure time of 0, 20, 40, 60, 70 sec, the calculated doses are illustrated in table 1. Figure 2 shows the spectral irradiance.

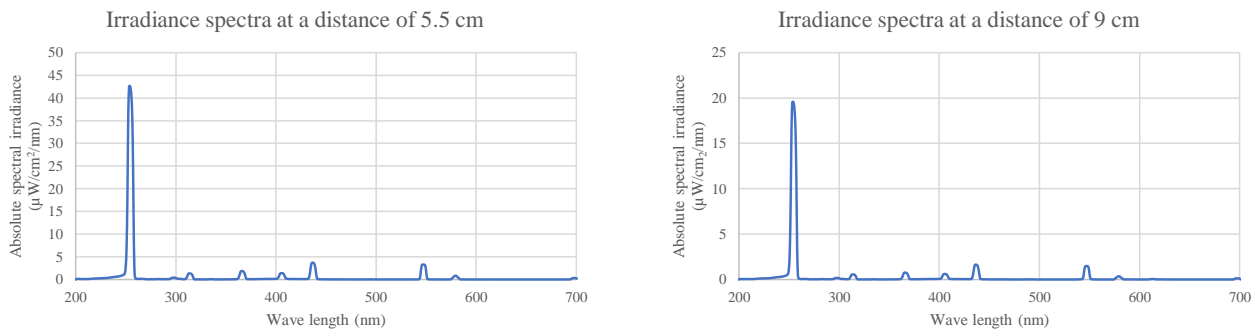


Figure 2. Spectral Irradiance

Table 1. Predicted Log inactivation of Sars-Cov-2^a

Dose (mJ.cm ⁻²)	Exposure time, sec	Distance, cm	Log reduction
0	0		0.00
6.28	20	5.5	2.99
12.56	40	5.5	5.98
18.84	60	5.5	8.97
21.98	70	5.5	10.47
0.00	0		0.00
2.80	20	9	1.33
5.60	40	9	2.67
8.40	60	9	4.00
9.80	70	9	4.67

^a<https://www.ncbi.nlm.nih.gov/nuccore/MT192772>, log inactivation based on D values



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Conclusions:

The optical device emits germicidal photons at 254 nm. Model predicted exposure doses to inactivate Sars-Cov-2 are shown above. The data needs to be validated experimentally using Sars-Cov-2 surrogate (Murine coronavirus MHV-1 NCBI accession: FJ647223.1).

Rev	Date	Details of Changes	Created By	Checked By	Report¹ Approved By
1	15, September, 2020	Initial release under new format and numbering.	Ankit Patras	Brahmaiah Pendyala	
2	10, October, 2020			Ankit Patras	Ankit Patras

¹This report is only for research purposes.