





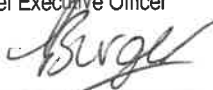
Certificate of Measurement

Measurement of:	Spectral irradiance, UV-C irradiance and UV hazard irradiance of a UVGI device
Manufacturer:	Device: Far UVC Africa, Lamp: GMY
Model number:	Device: 150W Wall Mount, Lamp: 150W Far-UVC
Serial number:	Device: FARUVCAFRICA-150WM-01, Lamp: N/A
Measurement for:	Far UVC Africa Unit 13, Leo Gem Business Park 44 Richards Drive Midrand Gauteng South Africa
Location of measurement:	NMISA UV Laboratory Room 017, Building 5, CSIR Campus Meiring Naude Road Brummeria, Pretoria
Measurement procedure:	See below
Period of measurement:	2021/06/29 to 2021/07/07

1 PROCEDURE

The spectral irradiance, UV-C irradiance and UV hazard irradiance of an ultraviolet germicidal irradiance (UVGI) device was measured. The 150W Wall Mount Far UVC device (Figure 1) consists of a 150W Far-UVC lamp with crystal quartz filters (information provided by customer) and a motion sensor. The motion sensor was bypassed for measurement of the device. The device was powered by an AC Power supply at approximately 230 V. The device was switched on approximately 2 hours before measurements were performed to allow the device to stabilise.

The spectral irradiance, UV-C irradiance and UV hazard irradiance was measured using a UV array spectrometer. The spectrometer measures spectrally from 200 nm – 430 nm and has a cosine diffuser. The front surface of the diffuser was used as the reference surface of the spectrometer. The total UV-C irradiance from 200 nm – 280 nm as defined by the CIE (<https://cie.co.at/eilvterm/17-21-008>) and UV hazard irradiance as defined in IEC 62471:2006/CIE S 009:2002 was determined from the spectral

Measured by Pieter du Toit Metrologist 	Checked by Macdufe Mkabela Metrologist 	For Chief Executive Officer 
Date of Issue 2021/07/15	Page 1 of 5	Certificate Number NMISA-PHO-2021-0086

MEASUREMENT OF SPECTRAL IRRADIANCE, UV-C IRRADIANCE AND UV HAZARD IRRADIANCE OF A UVGI DEVICE
 (Serial number: FARUVCAFRICA-150WM-01)

measurements using the applicable weighting functions. The spectrometer's calibration is traceable to national measurement standards of spectral irradiance maintained by PTB, the German National Metrology Institute.

The device was mounted in its intended orientation as shown in Figure 1 and the spectrometer was aligned approximately central and normal to the optical axis of the lamp. The optical axis of the lamp was defined as normal to the lamp's long axis and horizontal through the centre of the lamp. The spectral irradiance measurements were performed at approximately 200 mm from the front surface of the device, UV-C irradiance spatial distribution measurements were performed at approximately 1 m and 2 m from the front surface of the device and in a grid of 7 x 5 (horizontal x vertical) equally spaced positions, and the UV hazard irradiance measurement was performed at approximately 1 m from the device as requested by the customer.



Figure 1: Photograph of the UVGI device. The device is a wall mount unit with a 150W Far-UVC lamp with crystal quartz filters and a motion sensor. The motion sensor was bypassed.

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Date of Issue 2021/07/15	Page 2 of 5	Certificate Number NMISA-PHO-2021-0086

2 RESULTS

2.1 Spectral irradiance

The spectral irradiance measurement result is shown in Figure 2.

The spectrum peaks with a value of $0,354 \text{ W/m}^2/\text{nm}$ at approximately 222 nm with an estimated uncertainty of measurement of $\pm 14 \%$. There is also a smaller peak with a value of $0,00421 \text{ W/m}^2/\text{nm}$ at approximately 258 nm with an estimated uncertainty of measurement of $\pm 10 \%$.

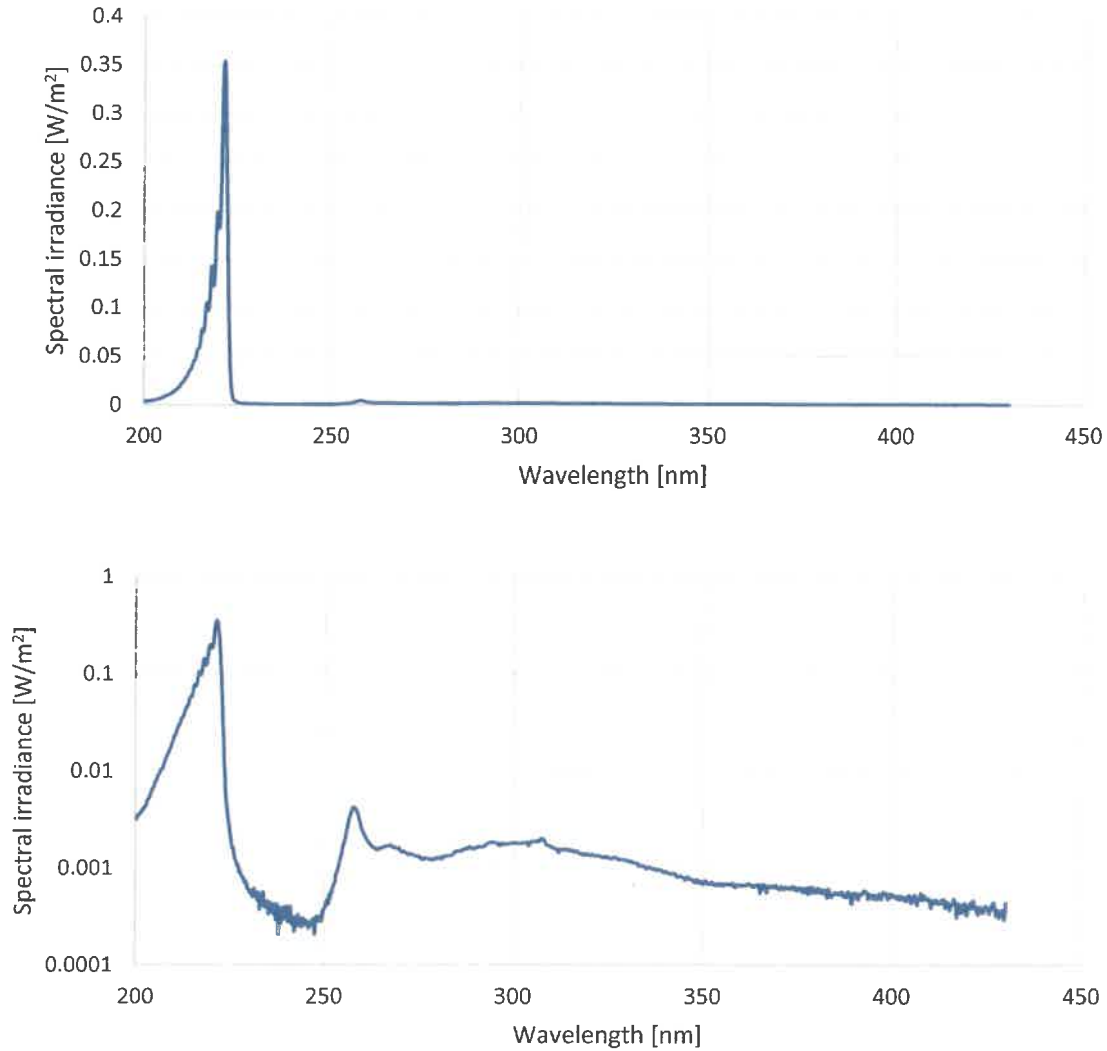


Figure 2: Spectral irradiance distribution of the device at 200 mm from the front surface of the device with a normal (top) and logarithmic (bottom) y-axis.

Measured by Pieter du Toit Metrologist	Checked by Macdufe Mkabela Metrologist	For Chief Executive Officer
Date of Issue 2021/07/15	Page 3 of 5	Certificate Number NMISA-PHO-2021-0086

2.2 UV-C irradiance spatial distribution

The UV-C irradiance spatial distribution measurements at 1 m and 2 m from the device are given in Table 1 and Table 2, respectively. The estimated uncertainty of measurement was $\pm 14\%$.

Table 1: UV-C irradiance spatial distribution measurements at 1 m from the device

UV-C irradiance [W/m ²]		x-axis position (relative to optical axis) [mm]						
		-225	-150	-75	0	75	150	225
y-axis position (relative to optical axis) [mm]	150	0,136	0,173	0,204	0,218	0,216	0,197	0,166
	75	0,146	0,188	0,221	0,236	0,232	0,212	0,180
	0	0,150	0,193	0,228	0,243	0,238	0,218	0,186
	-75	0,152	0,196	0,231	0,249	0,244	0,225	0,192
	-150	0,146	0,189	0,224	0,242	0,239	0,219	0,186

Table 2: UV-C irradiance spatial distribution measurements at 2 m from the device



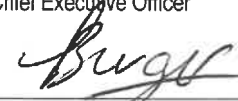
UV-C irradiance [W/m ²]		x-axis position (relative to optical axis) [mm]						
		-225	-150	-75	0	75	150	225
y-axis position (relative to optical axis) [mm]	150	0,059	0,063	0,066	0,067	0,066	0,064	0,060
	75	0,060	0,065	0,067	0,069	0,067	0,065	0,061
	0	0,061	0,066	0,069	0,070	0,068	0,066	0,062
	-75	0,062	0,068	0,071	0,072	0,070	0,067	0,063
	-150	0,062	0,070	0,074	0,073	0,071	0,068	0,064

Measured by Pieter du Toit Metrologist	Checked by Macdufe Mkabela Metrologist	For Chief Executive Officer
Date of Issue 2021/07/15	Page 4 of 5	Certificate Number NMISA-PHO-2021-0086

3 REMARKS

- 3.1 The reported uncertainties of measurement were calculated and expressed in accordance with the BIPM, IEC, ISO, IUPAP, OIML document entitled "A Guide to the Expression of Uncertainty in Measurement" (International Organisation for Standardisation, Geneva, Switzerland, 2008).
- 3.2 The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor of $k = 2$, which for a normal distribution approximates a level of confidence of 95,45 %.
- 3.3 Certain of the NMISA certificates are consistent with the capabilities that are included in Appendix C of the MRA (Mutual Recognition Arrangement) drawn up by the CIPM. Under the MRA, all participating institutes recognise the validity of each other's calibration and measurement certificates for the quantities and ranges and measurement uncertainties specified in Appendix C. For details see <http://www.bipm.org>.
- 3.4 The measurements were carried out at an ambient temperature of $23\text{ °C} \pm 2\text{ °C}$ and a relative humidity of $30\text{ \%RH} \pm 5\text{ \%RH}$.
- 3.5 The results reported in this certificate relate only to the item measured.
- 3.6 The device was measured as received, expect for bypassing of the motion sensor.
- 3.7 The device was operated for approximately 6 hours in total.
- 3.8 The procedure used by the laboratory is not accredited by the South African National Accreditation System (SANAS).
- 3.9 The measurement results are not an endorsement by NMISA of the safety or performance of the item measured.

end of certificate

Measured by Pieter du Toit Metrologist 	Checked by Macdufe Mkabela Metrologist 	For Chief Executive Officer 
Date of Issue 2021/07/15	Page 5 of 5	Certificate Number NMISA-PHO-2021-0086