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PHOTOMETRIC  
TEST REPORT

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<b>Report Number</b>	GNC-19595
<b>Customer</b>	Astro Lighting Limited
<b>Contact</b>	Ross Dickson
<b>Product Type</b>	LED Wall light
<b>Test Purpose</b>	Generation of Photometric Data
<b>Sales Order Ref</b>	Q-LUX17-21659
<b>Works Order Number</b>	WO-10242
<b>Test Item Reference</b>	TI-13784
<b>LAB Test Method Reference</b>	TES-102000
<b>Test Standards</b>	LM-79-08; (BS) EN 13032-4:2015; CIE S025:2015
<b>Lab Location Reference</b>	LUX-TSI
<b>Tested by</b>	Mike Sewell
<b>Date of Test</b>	07/07/2017
<b>Reviewed by</b>	Menno Schakel
<b>Number of products tested</b>	1

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Date: 13/07/2017



8010 - Kiwi Wall

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## Nomenclature

Lamp Orientation described below relates to the position in which a lamp is designed to operate for maximum performance and safety, these include:

BD - Base Down (bulb is vertically positioned with the metal base at the bottom, glass up)

BU - Base Up (bulb is vertically positioned with the metal base at the top, glass hanging down)

HBD - Horizontal  $+15^{\circ}$  to Base Down

H45 - Horizontal to  $-45^{\circ}$  only

VBU - Vertical Base Up  $\pm 15^{\circ}$

VBD - Vertical Base Down  $\pm 15^{\circ}$

HBU - Base Up  $\pm 90^{\circ}$  (bulb can be operated in a base up or horizontal position)

HOR - Horizontal Burn (bulb is positioned with the metal base parallel to the ground)

H75 - Horizontal  $\pm 75^{\circ}$  (bulb should not be operated within  $15^{\circ}$  of vertical)

U - Universal Burn (burn can be operated in any position)

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## Test Conditions

Measurements were made with an ambient temperature of  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . Measurements were taken only after sufficient time for thermal stabilisation has been allowed. Thermal stabilisation according to LM-79-08 was achieved before measurements are measured and reported.

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## Calibrations

The far field Type C Goniophotometer is calibrated using an intensity lamp calibrated by a NVLAP accredited calibration laboratory.

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## Test Equipment

UL LSI Custom Far-Field Type C Moving Mirror Goniophotometer measures intensity as a function of angle. On-axis spectral measurements taken using spectrometer, for which these measurements and outputs are not accredited.

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## Data Formats

IES (15 deg azimuth and 2.5 deg inclination) and LDT (15 deg C planes and 2.5 deg gamma angles)

Spectral Data file from which the calculation of chromaticity and CRI etc. have been performed and the derived results from the LightMtrX software are provided as a text file format.

All photometric data for LED products will be provided in ABSOLUTE photometric format and all non-LED data will be in relative photometric format with lamp lumens measured separately, where possible, for LOR estimation.

<b>Product Name</b>	8010 - Kiwi Wall
<b>Part/Serial Number</b>	N/A
<b>Type of Product</b>	LED Wall light
<b>Base Type</b>	Not Applicable - Luminaire
<b>Driver Type</b>	Internal
<b>Test Time</b>	30 mins
<b>Operating Orientation</b>	Base Down
<b>Test Orientation</b>	Base Down
<b>Ambient Temperature</b>	24.5°C
<b>Manufacturer</b>	Astro Lighting Limited
<b>Date of Manufacture</b>	Not Available
<b>Thermal Management</b>	Passive
<b>Dimmable</b>	No
<b>Pre-Burning Time</b>	0 hours
<b>Stabilisation Time</b>	75 mins
<b>Humidity</b>	51.5% RH
<b>Averaging Applied</b>	NONE

Driver Details		
Manufacturer		N/A
Model		N/A
Part/Serial #		N/A
Rated Voltage		N/A
Output	Current	N/A
	Voltage	N/A

Photometric Measurements	
Luminous Flux	567 lm
Luminous Efficacy	79 lm/W

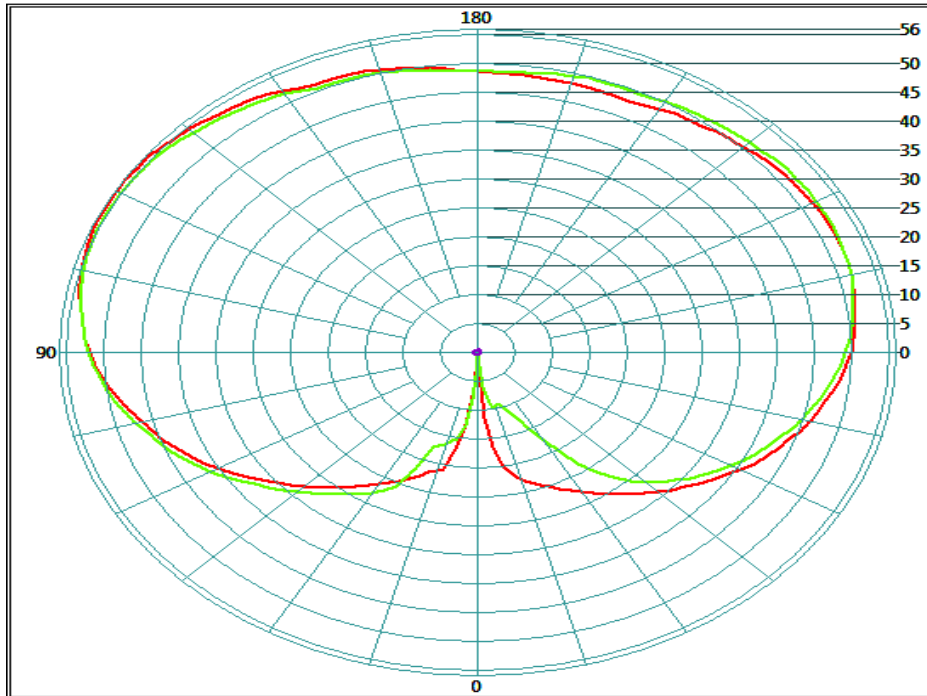
Dimension	Sample	Luminous Opening
Diameter/Width	130 mm	130 mm
Length	170 mm	130 mm
Height/Depth	356 mm	150 mm

Electrical Measurements	
Frequency	50 Hz
Voltage	229.180 V
Current	0.041 A
Power	7.2 W
Power Factor	0.771
Apparent Power	9.3 VA

### Goniophotometric Measurements

Beam Angle	Horizontal	180°
	Vertical	180°
On-axis Intensity		cd
Peak Intensity		56 cd
Peak Direction	Horizontal	30°
	Vertical	115°

Polar Plot (cd)



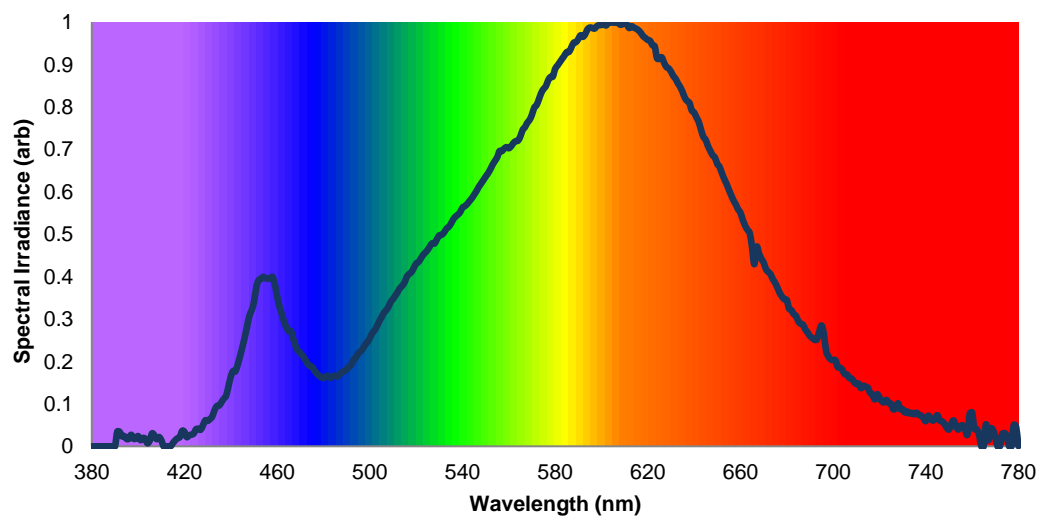
0.00	
180.00	
90.00	
270.00	
0.00	

## Appendices

### *On-axis Spectral Measurement*

The following data was determined from an on-axis spectral measurement using a SP1000 spectrometer at a distance of 500mm, for which these measurements and outputs are not accredited.

**Spectral Irradiance versus Wavelength**



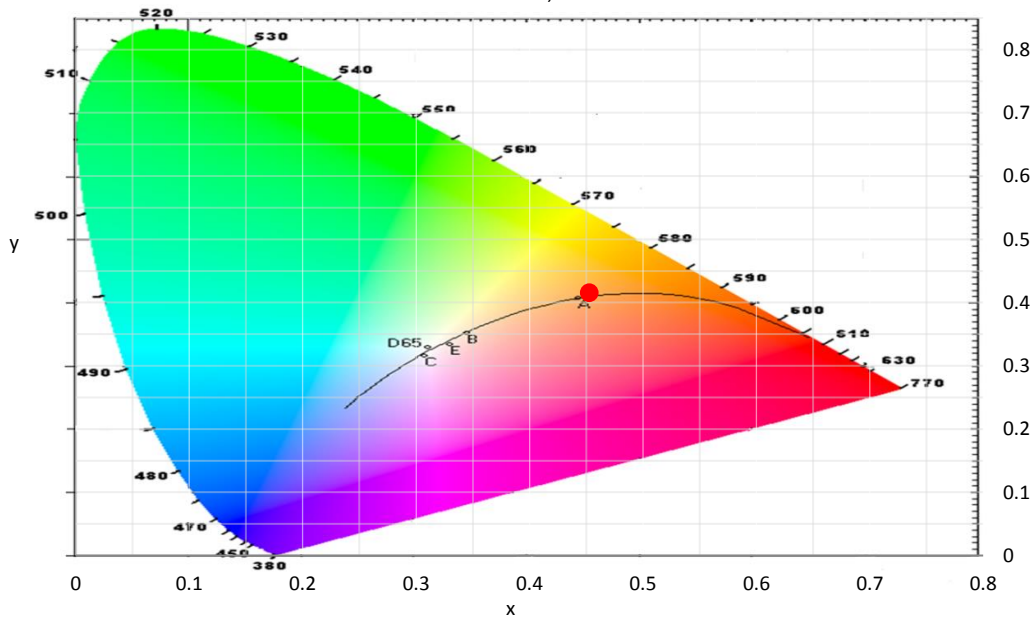
Colour Rendering Index Detail			
R1	79	R8	60
R2	89	R9	9
R3	97	R10	74
R4	78	R11	75
R5	78	R12	64
R6	85	R13	81
R7	84	R14	98

Colorimetric Details	
CCT	2840K
CRI (Ra)	81

Chromaticity Coordinates		
CIE 1931	x	0.4528
	y	0.4156
CIE 1960	u	0.2557
	v	0.3521
CIE 1976	u'	0.2557
	v'	0.5282
Duv		0.0025

CIE 1931 Colour Chart

● 0.45, 0.42



### Spectral Power Distribution

$\lambda$ (nm)	Arb units	$\lambda$ (nm)	Arb units	$\lambda$ (nm)	Arb units	$\lambda$ (nm)	Arb units
380	0.00E+00	430	5.99E-02	480	1.61E-01	530	4.97E-01
381	0.00E+00	431	6.45E-02	481	1.65E-01	531	4.99E-01
382	0.00E+00	432	7.03E-02	482	1.66E-01	532	5.04E-01
383	0.00E+00	433	8.54E-02	483	1.62E-01	533	5.13E-01
384	0.00E+00	434	9.51E-02	484	1.66E-01	534	5.17E-01
385	0.00E+00	435	9.63E-02	485	1.66E-01	535	5.25E-01
386	0.00E+00	436	1.04E-01	486	1.65E-01	536	5.35E-01
387	0.00E+00	437	1.12E-01	487	1.70E-01	537	5.42E-01
388	0.00E+00	438	1.20E-01	488	1.75E-01	538	5.46E-01
389	0.00E+00	439	1.42E-01	489	1.78E-01	539	5.52E-01
390	0.00E+00	440	1.64E-01	490	1.82E-01	540	5.63E-01
391	3.48E-02	441	1.78E-01	491	1.87E-01	541	5.66E-01
392	3.42E-02	442	1.77E-01	492	1.93E-01	542	5.71E-01
393	2.38E-02	443	1.93E-01	493	2.04E-01	543	5.78E-01
394	2.43E-02	444	2.13E-01	494	2.10E-01	544	5.85E-01
395	1.76E-02	445	2.34E-01	495	2.19E-01	545	5.93E-01
396	1.78E-02	446	2.57E-01	496	2.24E-01	546	6.01E-01
397	2.74E-02	447	2.82E-01	497	2.31E-01	547	6.11E-01
398	1.80E-02	448	3.07E-01	498	2.40E-01	548	6.19E-01
399	1.85E-02	449	3.21E-01	499	2.46E-01	549	6.28E-01
400	2.43E-02	450	3.40E-01	500	2.55E-01	550	6.36E-01
401	1.47E-02	451	3.74E-01	501	2.67E-01	551	6.44E-01
402	1.95E-02	452	3.92E-01	502	2.73E-01	552	6.53E-01
403	1.83E-02	453	3.95E-01	503	2.82E-01	553	6.64E-01
404	7.28E-03	454	4.00E-01	504	2.94E-01	554	6.73E-01
405	1.35E-02	455	3.97E-01	505	3.04E-01	555	6.82E-01
406	3.05E-02	456	3.96E-01	506	3.14E-01	556	6.96E-01
407	2.59E-02	457	3.95E-01	507	3.21E-01	557	6.96E-01
408	1.68E-02	458	3.99E-01	508	3.28E-01	558	7.02E-01
409	2.20E-02	459	3.82E-01	509	3.41E-01	559	7.06E-01
410	1.47E-02	460	3.54E-01	510	3.47E-01	560	7.03E-01
411	0.00E+00	461	3.30E-01	511	3.55E-01	561	7.08E-01
412	0.00E+00	462	3.12E-01	512	3.64E-01	562	7.15E-01
413	0.00E+00	463	2.94E-01	513	3.73E-01	563	7.20E-01
414	0.00E+00	464	2.80E-01	514	3.79E-01	564	7.21E-01
415	7.64E-03	465	2.71E-01	515	3.87E-01	565	7.31E-01
416	1.43E-02	466	2.72E-01	516	4.00E-01	566	7.46E-01
417	1.91E-02	467	2.53E-01	517	4.07E-01	567	7.53E-01
418	2.18E-02	468	2.36E-01	518	4.11E-01	568	7.63E-01
419	3.65E-02	469	2.26E-01	519	4.21E-01	569	7.70E-01
420	3.42E-02	470	2.20E-01	520	4.31E-01	570	7.82E-01
421	2.18E-02	471	2.14E-01	521	4.35E-01	571	7.99E-01
422	2.62E-02	472	2.06E-01	522	4.43E-01	572	8.05E-01
423	2.75E-02	473	1.96E-01	523	4.51E-01	573	8.18E-01
424	3.03E-02	474	1.90E-01	524	4.57E-01	574	8.33E-01
425	4.04E-02	475	1.88E-01	525	4.63E-01	575	8.43E-01
426	4.14E-02	476	1.80E-01	526	4.72E-01	576	8.49E-01
427	3.92E-02	477	1.72E-01	527	4.79E-01	577	8.63E-01
428	4.99E-02	478	1.67E-01	528	4.79E-01	578	8.71E-01
429	6.14E-02	479	1.63E-01	529	4.89E-01	579	8.72E-01
						580	8.90E-01



### Spectral Power Distribution

$\lambda$ (nm)	Arb units	$\lambda$ (nm)	Arb units	$\lambda$ (nm)	Arb units	$\lambda$ (nm)	Arb units
581	8.98E-01	631	8.74E-01	681	3.25E-01	731	7.98E-02
582	9.06E-01	632	8.67E-01	682	3.21E-01	732	8.21E-02
583	9.14E-01	633	8.56E-01	683	3.12E-01	733	7.76E-02
584	9.21E-01	634	8.47E-01	684	3.07E-01	734	7.90E-02
585	9.30E-01	635	8.36E-01	685	2.95E-01	735	7.56E-02
586	9.30E-01	636	8.22E-01	686	2.89E-01	736	7.95E-02
587	9.41E-01	637	8.15E-01	687	2.87E-01	737	7.43E-02
588	9.52E-01	638	8.10E-01	688	2.76E-01	738	7.26E-02
589	9.53E-01	639	7.92E-01	689	2.69E-01	739	6.68E-02
590	9.61E-01	640	7.87E-01	690	2.60E-01	740	5.94E-02
591	9.69E-01	641	7.76E-01	691	2.56E-01	741	7.22E-02
592	9.66E-01	642	7.65E-01	692	2.51E-01	742	6.74E-02
593	9.72E-01	643	7.46E-01	693	2.52E-01	743	6.08E-02
594	9.83E-01	644	7.30E-01	694	2.70E-01	744	6.49E-02
595	9.88E-01	645	7.23E-01	695	2.85E-01	745	7.36E-02
596	9.87E-01	646	7.08E-01	696	2.65E-01	746	6.12E-02
597	9.85E-01	647	6.97E-01	697	2.25E-01	747	5.90E-02
598	9.91E-01	648	6.86E-01	698	2.12E-01	748	5.35E-02
599	9.93E-01	649	6.81E-01	699	2.05E-01	749	4.44E-02
600	9.94E-01	650	6.66E-01	700	2.03E-01	750	3.97E-02
601	9.96E-01	651	6.59E-01	701	2.03E-01	751	5.27E-02
602	9.92E-01	652	6.44E-01	702	1.87E-01	752	6.11E-02
603	9.99E-01	653	6.31E-01	703	1.85E-01	753	4.81E-02
604	9.99E-01	654	6.19E-01	704	1.80E-01	754	3.97E-02
605	9.99E-01	655	6.06E-01	705	1.70E-01	755	4.78E-02
606	9.99E-01	656	5.92E-01	706	1.70E-01	756	4.93E-02
607	1.00E+00	657	5.80E-01	707	1.61E-01	757	4.01E-02
608	9.95E-01	658	5.70E-01	708	1.60E-01	758	2.80E-02
609	9.95E-01	659	5.59E-01	709	1.52E-01	759	7.69E-02
610	9.99E-01	660	5.51E-01	710	1.47E-01	760	7.99E-02
611	9.94E-01	661	5.35E-01	711	1.48E-01	761	4.15E-02
612	9.86E-01	662	5.21E-01	712	1.37E-01	762	4.07E-02
613	9.91E-01	663	5.11E-01	713	1.43E-01	763	2.85E-02
614	9.87E-01	664	5.03E-01	714	1.41E-01	764	0.00E+00
615	9.85E-01	665	4.71E-01	715	1.38E-01	765	0.00E+00
616	9.81E-01	666	4.29E-01	716	1.26E-01	766	5.23E-02
617	9.75E-01	667	4.71E-01	717	1.22E-01	767	1.45E-02
618	9.67E-01	668	4.55E-01	718	1.11E-01	768	4.22E-02
619	9.63E-01	669	4.43E-01	719	1.23E-01	769	3.91E-02
620	9.58E-01	670	4.34E-01	720	1.15E-01	770	2.25E-02
621	9.56E-01	671	4.18E-01	721	1.07E-01	771	0.00E+00
622	9.46E-01	672	4.11E-01	722	1.04E-01	772	0.00E+00
623	9.43E-01	673	4.06E-01	723	1.10E-01	773	2.85E-02
624	9.15E-01	674	3.94E-01	724	1.02E-01	774	3.14E-02
625	9.14E-01	675	3.85E-01	725	1.00E-01	775	2.45E-02
626	9.17E-01	676	3.74E-01	726	8.73E-02	776	0.00E+00
627	9.05E-01	677	3.61E-01	727	9.05E-02	777	0.00E+00
628	8.95E-01	678	3.53E-01	728	1.02E-01	778	5.01E-02
629	8.91E-01	679	3.46E-01	729	8.78E-02	779	4.67E-02
630	8.84E-01	680	3.45E-01	730	8.77E-02	780	5.58E-04

### Measurement Uncertainty

The following is the reported expanded uncertainty of the UL 6440T Type C Mirror Goniophotometer.

Parameter	Uncertainty
Total Luminous Flux (%)	$\pm 4.9$
Luminous Intensity (%)	$\pm 4.9$
Temperature (°C)	$\pm 1.0$
Voltage DC TY720 (%)	$\pm 0.02$
Current DC TY720 (%)	$\pm 0.10$
Voltage AC WT210 (%)	$\pm 0.0585$
Current AC WT210 (%)	$\pm 0.0251$
Power AC WT210 (%)	$\pm 0.2261$
Frequency (50/60 Hz) WT210 (%)	$\pm 0.0040$
Power Factor WT210 (%)	$\pm 0.0601$

The reported expanded uncertainty is based on the combined standard uncertainty multiplied by a coverage factor of  $k = 2$ . This value of  $k$  gives a coverage probability of approximately 95%, assuming a normal distribution. This determination of the measurement uncertainty has been done in accordance with international requirements including UKAS, BIPM Guide to the Expression of Uncertainty in Measurement and CIE 198:2011 and CIE S 025/E:2015.

Electrical measurement equipment used for the determination of results for this report, are compliant and meet the performance requirements of the measurement standards used.

----- END OF REPORT -----