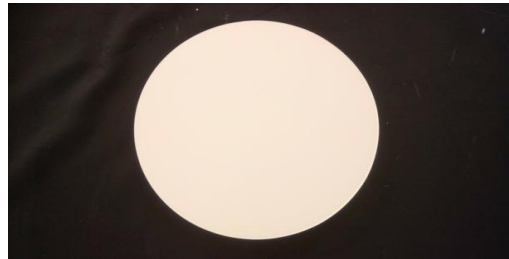


Report Number	GNC-20561
Customer	Astro Lighting Limited
Contact	David Green
Product Type	LED Wall wash
Test Purpose	Generation of photometric data
Quote Reference	Q-LUX18-22157
Works Order Number	WO-11208
Test Item Reference	TI-14632
LAB Test Method Reference	TES-102000
Test Standards	LM-79-08; (BS) EN 13032-4:2015; CIE S025:2015
Lab Location Reference	LUX-TSI
Tested by	Mike Sewell
Date of Test	22/02/2018
Reviewed by	Menno Schakel
Number of products tested	1

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Authorised by: Gareth Jones
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Signed:



Date: 22/02/2018



7744 Eclipse Round 250 LED

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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° to Base Down
H45 - Horizontal to -45° 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° of vertical)
U - Universal Burn (burn can be operated in any position)

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.

Calibrations

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

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.

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.

Product Name	7744 Eclipse Round 250 LED
Part/Serial Number	N/A
Type of Product	LED Wall wash
Base Type	Not Applicable - Luminaire
Driver Type	Internal
Test Time	30 mins
Operating Orientation	Base Up
Test Orientation	Base Up
Ambient Temperature	24.4°C
Manufacturer	Astro Lighting Limited
Date of Manufacture	Not Available
Thermal Management	Passive
Dimmable	No
Pre-Burning Time	0 hours
Stabilisation Time	30 mins
Humidity	24.6% RH
Averaging Applied	NONE



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

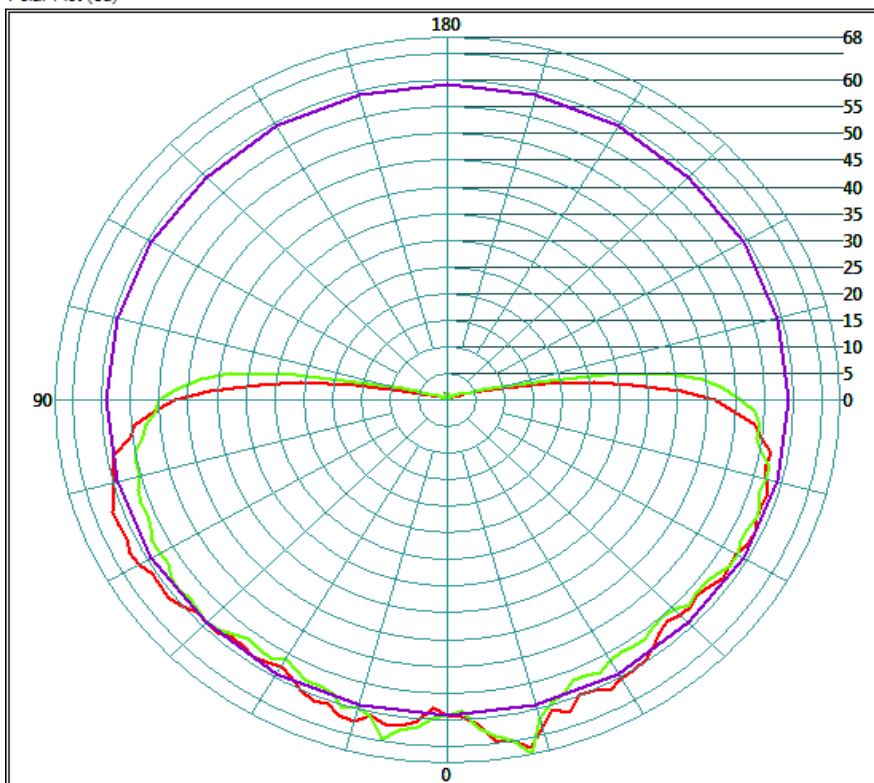
Photometric Measurements	
Luminous Flux	415 lm
Luminous Efficacy	51 lm/W

Dimension	Sample	Luminous Opening
Diameter/Width	250 mm Φ	175 mm Φ
Length		
Height/Depth	40 mm	30 mm

Electrical Measurements	
Frequency	60 Hz
Voltage	120.0 V
Current	0.084 A
Power	8.1 W
Power Factor	0.799
Apparent Power	10.1 VA

Goniophotometric Measurements		
Beam Angle	Horizontal	180°
	Vertical	180°
On-axis Intensity		59 cd
Peak Intensity		68 cd
Peak Direction	Horizontal	270°
	Vertical	13°

Polar Plot (cd)

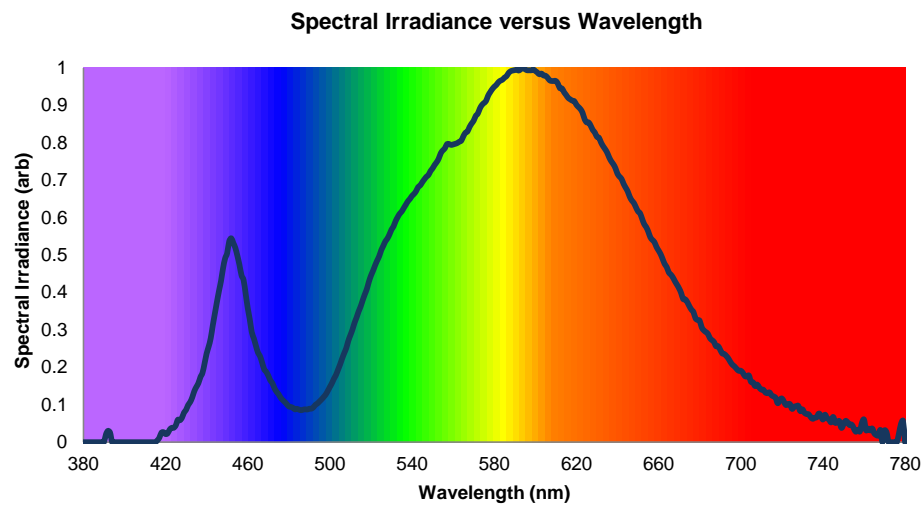


0.00	Red
180.00	Red
90.00	Green
270.00	Green
0.00	Purple

Appendices

On-axis Spectral Measurement

The following data was determined from an on-axis spectral measurement using a SP1000 spectrometer at a distance of 1500mm, for which these measurements and outputs are not accredited.

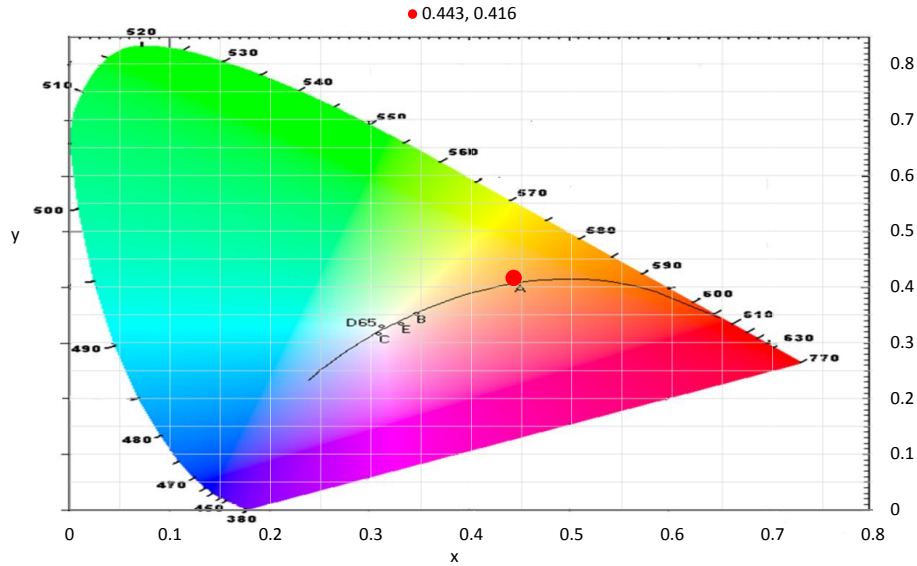


Colour Rendering Index Detail			
R1	72	R8	55
R2	81	R9	-9
R3	89	R10	55
R4	72	R11	65
R5	69	R12	40
R6	72	R13	73
R7	84	R14	93

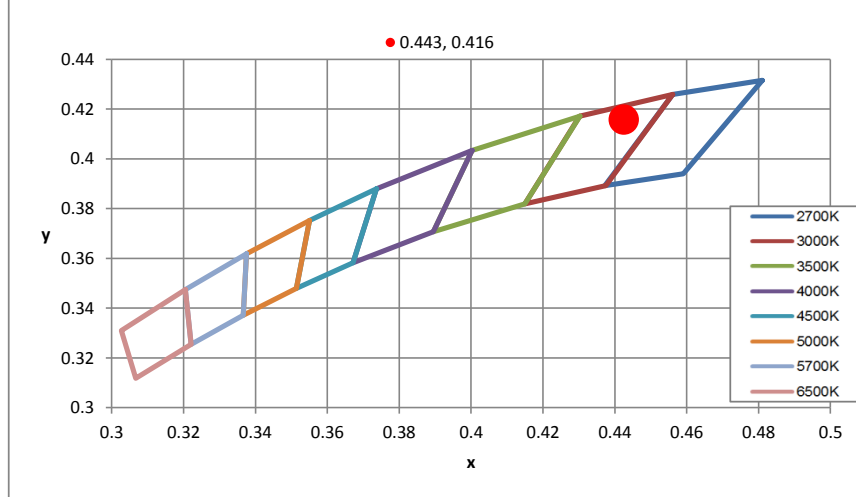
Colorimetric Details	
CCT	2999K
CRI (Ra)	74

Chromaticity Coordinates		
CIE 1931	x	0.4425
	y	0.4158
CIE 1960	u	0.2492
	v	0.3512
CIE 1976	u'	0.2492
	v'	0.5267
Duv		0.0037

CIE 1931 Colour Chart



CIE 1931 x, y Chromaticity Diagram - Nominal CCT Quadrangles



Spectral Power Distribution

λ (nm)	Arb units	λ (nm)	Arb units	λ (nm)	Arb units	λ (nm)	Arb units
380	0.00E+00	430	8.63E-02	480	9.56E-02	530	5.68E-01
381	0.00E+00	431	9.91E-02	481	9.42E-02	531	5.77E-01
382	0.00E+00	432	1.07E-01	482	9.18E-02	532	5.91E-01
383	0.00E+00	433	1.20E-01	483	8.76E-02	533	6.01E-01
384	0.00E+00	434	1.36E-01	484	8.91E-02	534	6.11E-01
385	0.00E+00	435	1.48E-01	485	8.70E-02	535	6.17E-01
386	0.00E+00	436	1.58E-01	486	8.54E-02	536	6.26E-01
387	0.00E+00	437	1.74E-01	487	8.69E-02	537	6.35E-01
388	0.00E+00	438	1.85E-01	488	8.79E-02	538	6.44E-01
389	0.00E+00	439	2.10E-01	489	8.73E-02	539	6.50E-01
390	0.00E+00	440	2.37E-01	490	8.94E-02	540	6.58E-01
391	2.08E-02	441	2.55E-01	491	8.96E-02	541	6.64E-01
392	3.04E-02	442	2.78E-01	492	9.34E-02	542	6.71E-01
393	2.56E-02	443	3.12E-01	493	9.99E-02	543	6.82E-01
394	0.00E+00	444	3.43E-01	494	1.04E-01	544	6.86E-01
395	0.00E+00	445	3.74E-01	495	1.09E-01	545	6.95E-01
396	0.00E+00	446	4.03E-01	496	1.15E-01	546	7.02E-01
397	0.00E+00	447	4.30E-01	497	1.21E-01	547	7.09E-01
398	0.00E+00	448	4.65E-01	498	1.28E-01	548	7.14E-01
399	0.00E+00	449	4.91E-01	499	1.37E-01	549	7.25E-01
400	0.00E+00	450	5.05E-01	500	1.47E-01	550	7.32E-01
401	0.00E+00	451	5.37E-01	501	1.58E-01	551	7.41E-01
402	0.00E+00	452	5.45E-01	502	1.70E-01	552	7.48E-01
403	0.00E+00	453	5.32E-01	503	1.80E-01	553	7.58E-01
404	0.00E+00	454	5.19E-01	504	1.94E-01	554	7.72E-01
405	0.00E+00	455	4.98E-01	505	2.08E-01	555	7.80E-01
406	0.00E+00	456	4.74E-01	506	2.24E-01	556	7.86E-01
407	0.00E+00	457	4.46E-01	507	2.38E-01	557	7.96E-01
408	0.00E+00	458	4.33E-01	508	2.52E-01	558	7.97E-01
409	0.00E+00	459	3.97E-01	509	2.71E-01	559	7.94E-01
410	0.00E+00	460	3.59E-01	510	2.86E-01	560	7.96E-01
411	0.00E+00	461	3.29E-01	511	3.01E-01	561	7.97E-01
412	0.00E+00	462	2.94E-01	512	3.19E-01	562	7.99E-01
413	0.00E+00	463	2.77E-01	513	3.33E-01	563	8.03E-01
414	0.00E+00	464	2.58E-01	514	3.49E-01	564	8.06E-01
415	0.00E+00	465	2.39E-01	515	3.63E-01	565	8.18E-01
416	4.68E-03	466	2.30E-01	516	3.80E-01	566	8.27E-01
417	1.20E-02	467	2.13E-01	517	3.95E-01	567	8.30E-01
418	2.53E-02	468	1.95E-01	518	4.09E-01	568	8.42E-01
419	2.67E-02	469	1.88E-01	519	4.29E-01	569	8.52E-01
420	2.17E-02	470	1.78E-01	520	4.45E-01	570	8.59E-01
421	2.34E-02	471	1.65E-01	521	4.58E-01	571	8.72E-01
422	3.35E-02	472	1.58E-01	522	4.72E-01	572	8.78E-01
423	3.83E-02	473	1.45E-01	523	4.85E-01	573	8.92E-01
424	3.85E-02	474	1.35E-01	524	4.97E-01	574	9.01E-01
425	4.51E-02	475	1.28E-01	525	5.13E-01	575	9.06E-01
426	5.99E-02	476	1.19E-01	526	5.25E-01	576	9.12E-01
427	5.85E-02	477	1.13E-01	527	5.36E-01	577	9.26E-01
428	6.54E-02	478	1.08E-01	528	5.44E-01	578	9.35E-01
429	7.90E-02	479	1.02E-01	529	5.55E-01	579	9.43E-01
						580	9.50E-01

Spectral Power Distribution

λ (nm)	Arb units	λ (nm)	Arb units	λ (nm)	Arb units	λ (nm)	Arb units
581	9.55E-01	631	8.14E-01	681	3.07E-01	731	7.88E-02
582	9.62E-01	632	8.01E-01	682	2.99E-01	732	7.54E-02
583	9.66E-01	633	7.91E-01	683	2.94E-01	733	7.48E-02
584	9.69E-01	634	7.83E-01	684	2.90E-01	734	6.77E-02
585	9.74E-01	635	7.74E-01	685	2.78E-01	735	6.23E-02
586	9.78E-01	636	7.61E-01	686	2.73E-01	736	6.53E-02
587	9.87E-01	637	7.51E-01	687	2.68E-01	737	6.66E-02
588	9.91E-01	638	7.43E-01	688	2.56E-01	738	7.66E-02
589	9.93E-01	639	7.33E-01	689	2.57E-01	739	7.13E-02
590	9.94E-01	640	7.18E-01	690	2.47E-01	740	6.05E-02
591	9.95E-01	641	7.10E-01	691	2.37E-01	741	7.35E-02
592	9.93E-01	642	7.03E-01	692	2.36E-01	742	6.41E-02
593	9.97E-01	643	6.90E-01	693	2.30E-01	743	6.08E-02
594	1.00E+00	644	6.80E-01	694	2.24E-01	744	5.30E-02
595	9.97E-01	645	6.70E-01	695	2.14E-01	745	6.76E-02
596	9.94E-01	646	6.56E-01	696	2.07E-01	746	5.20E-02
597	9.94E-01	647	6.46E-01	697	2.02E-01	747	5.39E-02
598	9.94E-01	648	6.39E-01	698	1.96E-01	748	5.64E-02
599	9.96E-01	649	6.28E-01	699	1.91E-01	749	3.82E-02
600	9.92E-01	650	6.17E-01	700	1.91E-01	750	4.70E-02
601	9.88E-01	651	6.12E-01	701	1.86E-01	751	5.69E-02
602	9.83E-01	652	5.97E-01	702	1.77E-01	752	5.34E-02
603	9.85E-01	653	5.83E-01	703	1.75E-01	753	4.57E-02
604	9.80E-01	654	5.75E-01	704	1.78E-01	754	4.73E-02
605	9.79E-01	655	5.63E-01	705	1.61E-01	755	3.75E-02
606	9.74E-01	656	5.48E-01	706	1.60E-01	756	2.79E-02
607	9.67E-01	657	5.41E-01	707	1.50E-01	757	3.33E-02
608	9.65E-01	658	5.35E-01	708	1.54E-01	758	2.87E-02
609	9.65E-01	659	5.22E-01	709	1.46E-01	759	5.15E-02
610	9.65E-01	660	5.12E-01	710	1.40E-01	760	6.06E-02
611	9.58E-01	661	5.03E-01	711	1.40E-01	761	3.18E-02
612	9.46E-01	662	4.90E-01	712	1.33E-01	762	3.65E-02
613	9.45E-01	663	4.76E-01	713	1.31E-01	763	3.14E-02
614	9.35E-01	664	4.68E-01	714	1.33E-01	764	3.67E-02
615	9.28E-01	665	4.54E-01	715	1.25E-01	765	2.39E-02
616	9.20E-01	666	4.48E-01	716	1.22E-01	766	1.90E-02
617	9.16E-01	667	4.40E-01	717	1.19E-01	767	1.81E-02
618	9.13E-01	668	4.30E-01	718	1.04E-01	768	3.26E-02
619	9.11E-01	669	4.21E-01	719	1.12E-01	769	0.00E+00
620	9.02E-01	670	4.11E-01	720	1.17E-01	770	3.14E-02
621	8.96E-01	671	3.99E-01	721	1.08E-01	771	2.61E-02
622	8.90E-01	672	3.82E-01	722	9.93E-02	772	0.00E+00
623	8.80E-01	673	3.82E-01	723	1.02E-01	773	0.00E+00
624	8.64E-01	674	3.74E-01	724	1.02E-01	774	0.00E+00
625	8.55E-01	675	3.63E-01	725	8.88E-02	775	0.00E+00
626	8.55E-01	676	3.54E-01	726	9.50E-02	776	0.00E+00
627	8.45E-01	677	3.48E-01	727	9.59E-02	777	2.26E-02
628	8.34E-01	678	3.31E-01	728	9.73E-02	778	4.83E-02
629	8.27E-01	679	3.27E-01	729	8.30E-02	779	5.68E-02
630	8.16E-01	680	3.25E-01	730	8.80E-02	780	0.00E+00

Measurement Uncertainty

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

Parameter	Uncertainty
Total Luminous Flux (%)	± 4.9
Luminous Intensity (%)	± 4.9
Temperature (°C)	± 1.0
Voltage DC TY720 (%)	± 0.017
Current DC TY720 (%)	± 0.10
Voltage AC WT210 (%)	± 0.059
Current AC WT210 (%)	± 0.025
Power AC WT210 (%)	± 0.23
Frequency (50/60 Hz) WT210 (%)	± 0.004
Power Factor WT210 (%)	± 0.06

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 -----