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PHOTOMETRIC  
TEST REPORT

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Report Number	TRN-16795
Customer	Astro Lighting Limited
Contact	Stuart Wells
Product Type	LED Wall light
Test Purpose	Generation of Photometric Data
Sales Order Ref	Q-LUX16-20616
Works Order Number	WO-7442
Test Item Reference	TI-11654
LAB Test Method Reference	TES-10050
Test Standards	LM-79-08
Lab Location Reference	LUX-TSI
Tested by	Mike Sewell
Date of Test	4/22/2016
Analysed by	Andrew Thomas
Number of products tested	1

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Date: 7/1/2016



Romano LED 1200

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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. The Integrating Sphere Spectrometer System is calibrated using total spectral flux lamp calibrated by NPL.

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## Test Equipment

UL LSI Custom Far-Field Type C Moving Mirror Goniophotometer measures intensity as a function of angle. 1m Integrating Sphere Spectrometer System for Total Spectral Flux.

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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)

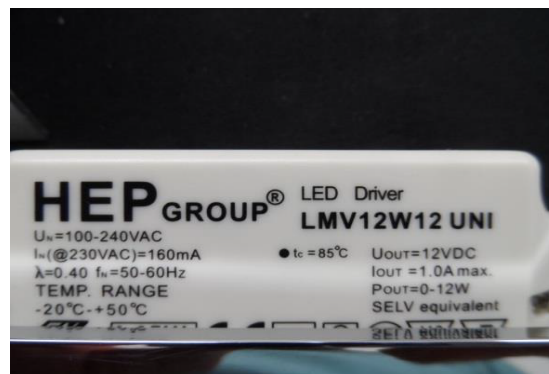
Spectral Data file from which the calculation of chromaticity and CRI etc. have been performed and the derived results from the LightMtrX software are provided as a text file format.

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.

Product Name	Romano 1200 LED
Part/Serial Number	1150017
Type of Product	LED Wall light
Base Type	Not Applicable - Luminaire
Driver Type	Internal DC
Test Time	30 mins
Operating Orientation	Horizontal
Test Orientation	Horizontal
Ambient Temperature	25.3°C
Manufacturer	Astro Lighting Limited
Date of Manufacture	Not Available
Thermal Management	Passive
Dimmable	No
Pre-Burning Time	0 hours
Stabilisation Time	60 mins
Humidity	38.3% RH
Averaging Applied	Symmetry in upper and lower lobes

Photometric Measurements	
Luminous Flux	1028 lm
Luminous Efficacy	52 lm/W

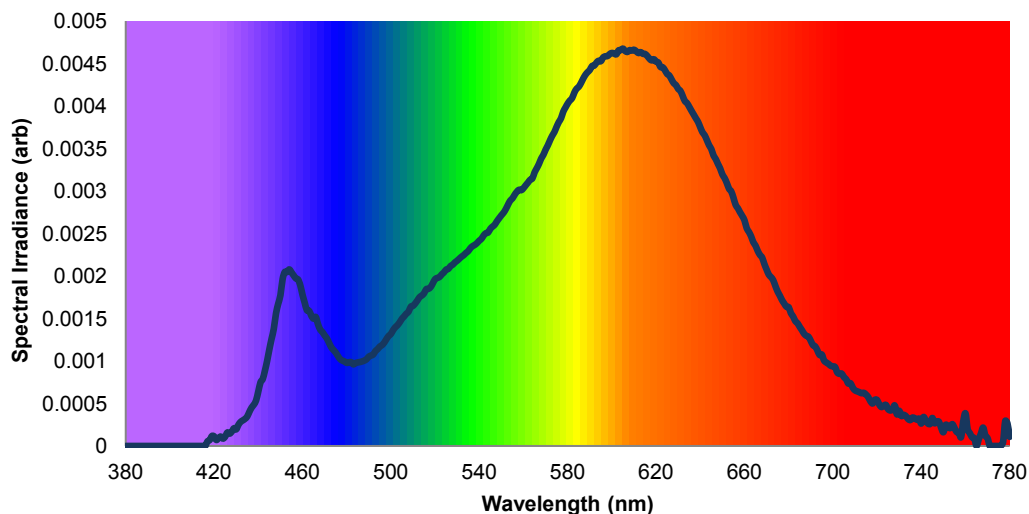
Dimension	Sample	Luminous Opening
Diameter/Width	40 mm	37 mm
Length	1200 mm	1000 mm
Height/Depth	60 mm	30 mm



Driver Details		
Manufacturer	HEP Group	
Model	LMV12W12 UNI	
Part/Serial #	N/A	
Rating	100-240	
Output	Current	1 A max
	Voltage	12.000 V

Electrical Measurements	
Frequency	50 Hz
Voltage	239.770 V
Current	0.170 A
Power	19.6 W
Power Factor	0.482
Peak Power VA	40.7

Spectral Irradiance versus Wavelength



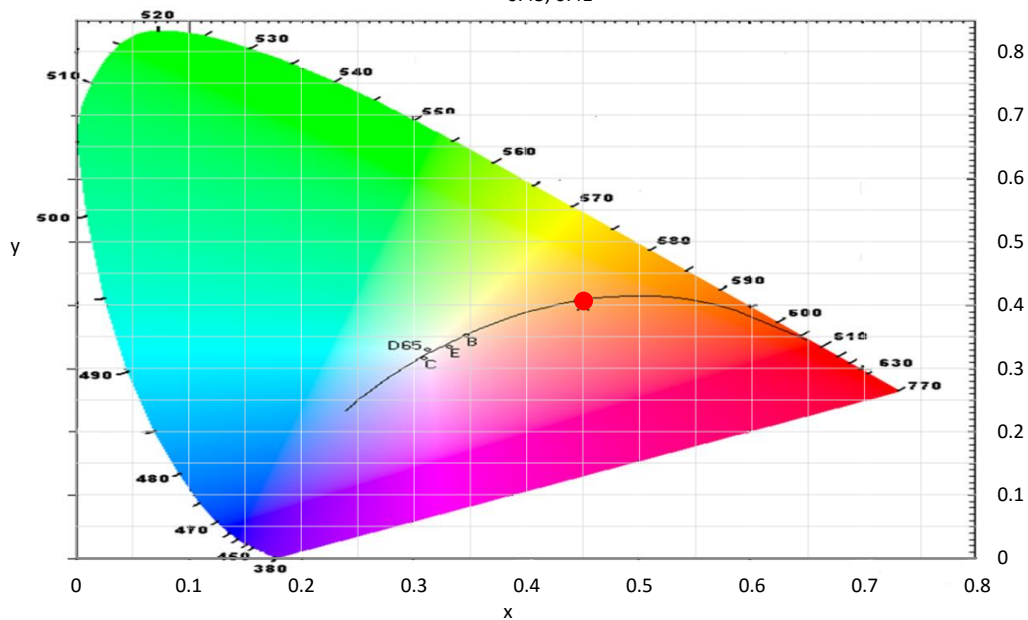
Colour Rendering Index Detail			
R1	82.9	R8	61.9
R2	93.2	R9	18.2
R3	95.3	R10	84.1
R4	80.7	R11	79.7
R5	82.9	R12	74.9
R6	91.9	R13	85.5
R7	82.8	R14	98.3

Colorimetric Details	
CCT	2798K
CRI (Ra)	84

Chromaticity Coordinates		
CIE 1931	x	0.4505
	y	0.4060
CIE 1960	u	0.2585
	v	0.3495
CIE 1976	u'	0.2585
	v'	0.5242
Duv		0.0009

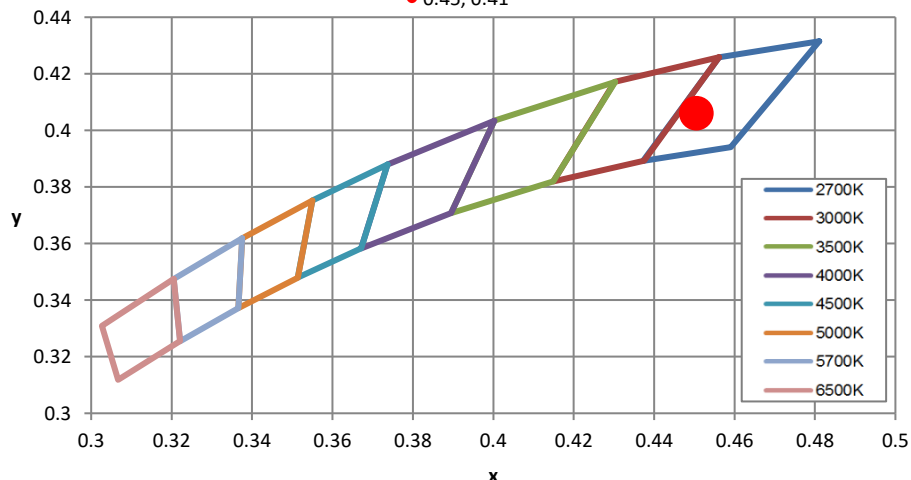
CIE 1931 Colour Chart

● 0.45, 0.41



CIE 1931 x, y Chromaticity Diagram - Nominal CCT Quadrangles

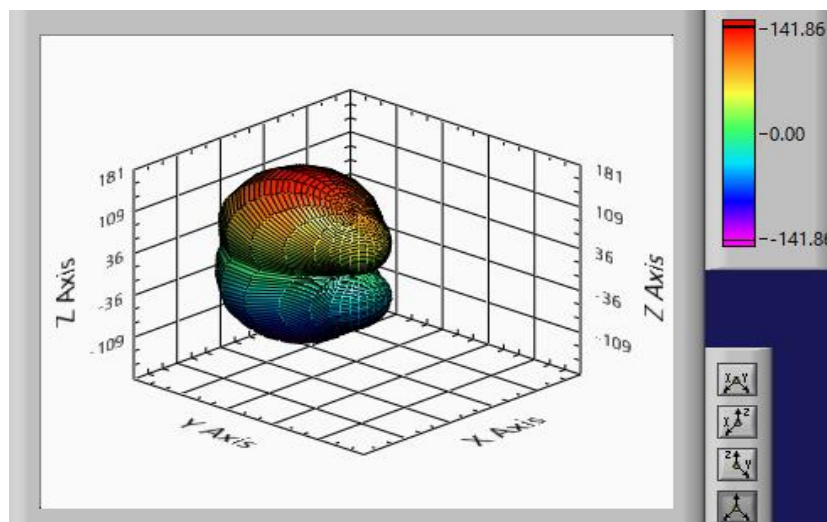
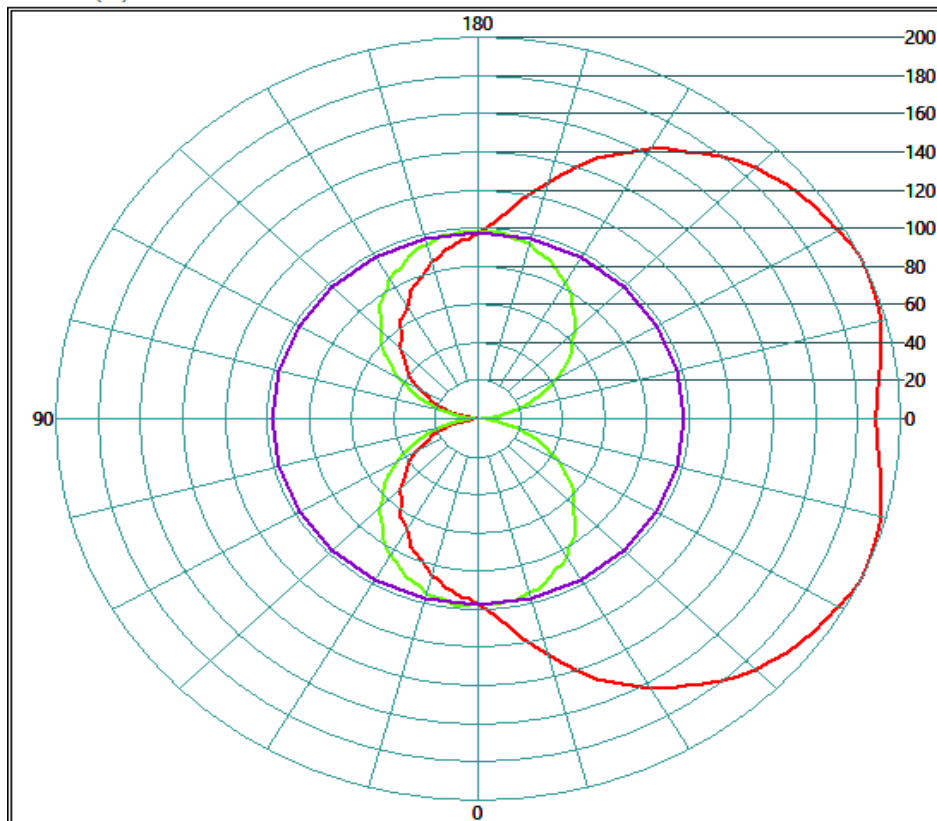
● 0.45, 0.41



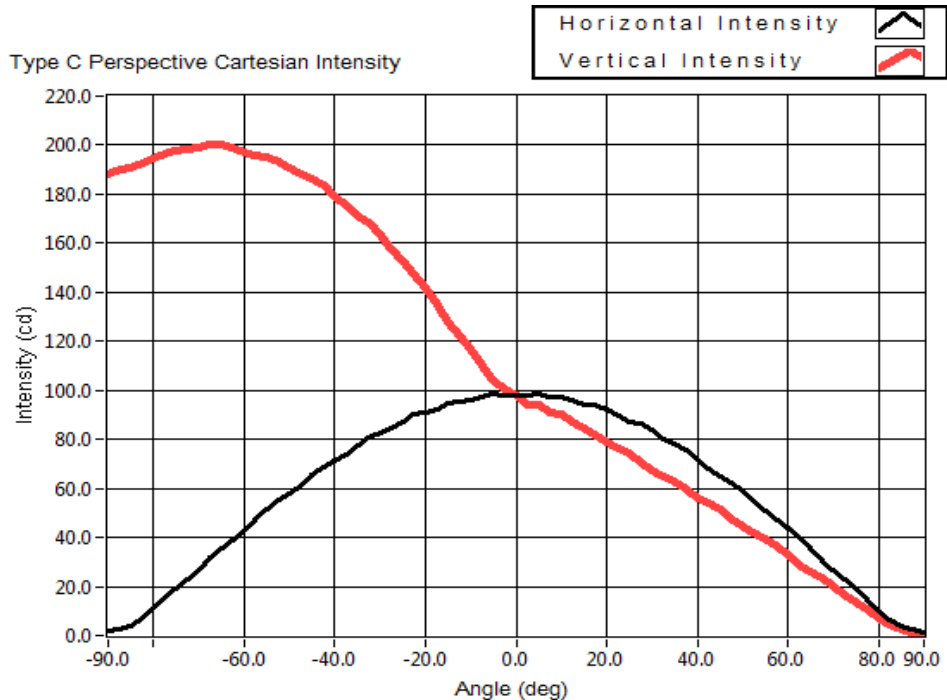
### Goniophotometric Measurements

Beam Angle	Horizontal	178°
	Vertical	N/A
On-axis Intensity		98 cd
Peak Intensity		200 cd
Peak Direction	Horizontal	180°
	Vertical	65°

Polar Plot (cd)



Mounting Height (m)	Beam Cone Width (m)	Orthogonal Beam Cone Width (m)	Projected Illuminance (lux)
0.5	0.47	1.50	391.6
1	0.95	3.01	97.9
2	1.89	6.01	24.5
3	2.84	9.02	10.9
4	3.79	12.03	6.1
5	4.73	15.03	3.9
6	5.68	18.04	2.7
8	7.57	24.05	1.5
10	9.47	30.07	1.0
20	18.94	60.13	0.2





### Spectral Power Distribution

$\lambda$ (nm)	W	$\lambda$ (nm)	W	$\lambda$ (nm)	W	$\lambda$ (nm)	W
380	0.000000	430	1.96E-04	480	9.77E-04	530	2.18E-03
381	0.00E+00	431	2.49E-04	481	9.84E-04	531	2.20E-03
382	0.00E+00	432	2.84E-04	482	9.87E-04	532	2.23E-03
383	0.00E+00	433	3.01E-04	483	9.60E-04	533	2.25E-03
384	0.00E+00	434	3.19E-04	484	9.75E-04	534	2.27E-03
385	0.00E+00	435	3.48E-04	485	9.83E-04	535	2.29E-03
386	0.00E+00	436	4.04E-04	486	9.88E-04	536	2.33E-03
387	0.00E+00	437	4.53E-04	487	9.95E-04	537	2.35E-03
388	0.00E+00	438	4.87E-04	488	1.00E-03	538	2.37E-03
389	0.00E+00	439	5.37E-04	489	1.02E-03	539	2.39E-03
390	0.00E+00	440	6.41E-04	490	1.05E-03	540	2.42E-03
391	0.00E+00	441	7.50E-04	491	1.06E-03	541	2.44E-03
392	0.00E+00	442	7.88E-04	492	1.08E-03	542	2.48E-03
393	0.00E+00	443	8.87E-04	493	1.12E-03	543	2.50E-03
394	0.00E+00	444	1.00E-03	494	1.14E-03	544	2.51E-03
395	0.00E+00	445	1.14E-03	495	1.17E-03	545	2.56E-03
396	0.00E+00	446	1.26E-03	496	1.19E-03	546	2.58E-03
397	0.00E+00	447	1.38E-03	497	1.22E-03	547	2.60E-03
398	0.00E+00	448	1.56E-03	498	1.26E-03	548	2.64E-03
399	0.00E+00	449	1.67E-03	499	1.29E-03	549	2.68E-03
400	0.00E+00	450	1.77E-03	500	1.32E-03	550	2.71E-03
401	0.00E+00	451	1.97E-03	501	1.36E-03	551	2.75E-03
402	0.00E+00	452	2.05E-03	502	1.40E-03	552	2.79E-03
403	0.00E+00	453	2.05E-03	503	1.42E-03	553	2.84E-03
404	0.00E+00	454	2.08E-03	504	1.46E-03	554	2.89E-03
405	0.00E+00	455	2.04E-03	505	1.50E-03	555	2.91E-03
406	0.00E+00	456	2.01E-03	506	1.53E-03	556	2.96E-03
407	0.00E+00	457	1.97E-03	507	1.56E-03	557	2.99E-03
408	0.00E+00	458	1.96E-03	508	1.58E-03	558	3.02E-03
409	0.00E+00	459	1.89E-03	509	1.64E-03	559	3.01E-03
410	0.00E+00	460	1.78E-03	510	1.65E-03	560	3.03E-03
411	0.00E+00	461	1.68E-03	511	1.68E-03	561	3.07E-03
412	0.00E+00	462	1.60E-03	512	1.71E-03	562	3.10E-03
413	0.00E+00	463	1.59E-03	513	1.75E-03	563	3.13E-03
414	0.00E+00	464	1.53E-03	514	1.77E-03	564	3.15E-03
415	0.00E+00	465	1.50E-03	515	1.80E-03	565	3.22E-03
416	0.00E+00	466	1.52E-03	516	1.84E-03	566	3.27E-03
417	5.40E-05	467	1.43E-03	517	1.85E-03	567	3.32E-03
418	6.95E-05	468	1.37E-03	518	1.87E-03	568	3.38E-03
419	1.17E-04	469	1.34E-03	519	1.92E-03	569	3.43E-03
420	1.13E-04	470	1.30E-03	520	1.96E-03	570	3.49E-03
421	7.03E-05	471	1.27E-03	521	1.98E-03	571	3.54E-03
422	9.30E-05	472	1.21E-03	522	1.99E-03	572	3.60E-03
423	1.11E-04	473	1.16E-03	523	2.02E-03	573	3.65E-03
424	8.61E-05	474	1.13E-03	524	2.04E-03	574	3.70E-03
425	1.10E-04	475	1.10E-03	525	2.08E-03	575	3.76E-03
426	1.59E-04	476	1.06E-03	526	2.08E-03	576	3.81E-03
427	1.45E-04	477	1.02E-03	527	2.12E-03	577	3.86E-03
428	1.69E-04	478	1.01E-03	528	2.13E-03	578	3.93E-03
429	2.09E-04	479	9.95E-04	529	2.16E-03	579	3.98E-03
						580	4.03E-03



Spectral Power Distribution

$\lambda$ (nm)	W	$\lambda$ (nm)	W	$\lambda$ (nm)	W	$\lambda$ (nm)	W
581	4.07E-03	631	4.18E-03	681	1.56E-03	731	3.54E-04
582	4.09E-03	632	4.12E-03	682	1.52E-03	732	3.66E-04
583	4.16E-03	633	4.06E-03	683	1.47E-03	733	3.52E-04
584	4.20E-03	634	4.03E-03	684	1.44E-03	734	3.19E-04
585	4.23E-03	635	3.99E-03	685	1.40E-03	735	3.04E-04
586	4.27E-03	636	3.94E-03	686	1.36E-03	736	3.34E-04
587	4.32E-03	637	3.90E-03	687	1.32E-03	737	3.27E-04
588	4.37E-03	638	3.86E-03	688	1.30E-03	738	3.09E-04
589	4.40E-03	639	3.81E-03	689	1.28E-03	739	3.21E-04
590	4.42E-03	640	3.75E-03	690	1.24E-03	740	2.64E-04
591	4.47E-03	641	3.69E-03	691	1.19E-03	741	3.41E-04
592	4.48E-03	642	3.66E-03	692	1.17E-03	742	3.01E-04
593	4.51E-03	643	3.60E-03	693	1.12E-03	743	2.65E-04
594	4.53E-03	644	3.54E-03	694	1.07E-03	744	2.60E-04
595	4.53E-03	645	3.49E-03	695	1.08E-03	745	3.30E-04
596	4.57E-03	646	3.42E-03	696	1.01E-03	746	2.68E-04
597	4.59E-03	647	3.38E-03	697	9.83E-04	747	2.88E-04
598	4.59E-03	648	3.32E-03	698	9.66E-04	748	2.84E-04
599	4.61E-03	649	3.26E-03	699	9.44E-04	749	2.14E-04
600	4.62E-03	650	3.19E-03	700	9.37E-04	750	1.61E-04
601	4.62E-03	651	3.15E-03	701	9.29E-04	751	2.48E-04
602	4.61E-03	652	3.09E-03	702	8.64E-04	752	2.35E-04
603	4.65E-03	653	3.03E-03	703	8.49E-04	753	2.10E-04
604	4.66E-03	654	3.00E-03	704	8.51E-04	754	2.57E-04
605	4.68E-03	655	2.92E-03	705	8.09E-04	755	2.14E-04
606	4.65E-03	656	2.84E-03	706	7.85E-04	756	1.64E-04
607	4.64E-03	657	2.80E-03	707	7.35E-04	757	1.60E-04
608	4.66E-03	658	2.75E-03	708	7.38E-04	758	1.04E-04
609	4.65E-03	659	2.71E-03	709	6.86E-04	759	2.89E-04
610	4.66E-03	660	2.66E-03	710	6.55E-04	760	3.84E-04
611	4.64E-03	661	2.56E-03	711	6.43E-04	761	1.94E-04
612	4.62E-03	662	2.52E-03	712	6.33E-04	762	1.50E-04
613	4.63E-03	663	2.47E-03	713	6.21E-04	763	1.01E-04
614	4.61E-03	664	2.40E-03	714	6.25E-04	764	9.09E-05
615	4.61E-03	665	2.36E-03	715	6.04E-04	765	0.00E+00
616	4.59E-03	666	2.30E-03	716	5.75E-04	766	7.82E-05
617	4.56E-03	667	2.25E-03	717	5.26E-04	767	1.46E-04
618	4.54E-03	668	2.22E-03	718	5.00E-04	768	2.16E-04
619	4.55E-03	669	2.14E-03	719	5.43E-04	769	1.21E-04
620	4.52E-03	670	2.08E-03	720	5.41E-04	770	9.11E-05
621	4.51E-03	671	2.02E-03	721	4.87E-04	771	0.00E+00
622	4.46E-03	672	1.99E-03	722	4.58E-04	772	0.00E+00
623	4.46E-03	673	1.95E-03	723	4.75E-04	773	0.00E+00
624	4.42E-03	674	1.88E-03	724	4.83E-04	774	0.00E+00
625	4.38E-03	675	1.82E-03	725	4.33E-04	775	0.00E+00
626	4.36E-03	676	1.77E-03	726	4.18E-04	776	0.00E+00
627	4.31E-03	677	1.72E-03	727	4.30E-04	777	4.43E-05
628	4.27E-03	678	1.68E-03	728	4.77E-04	778	2.93E-04
629	4.25E-03	679	1.64E-03	729	3.71E-04	779	2.65E-04
630	4.20E-03	680	1.63E-03	730	4.15E-04	780	1.08E-04

### Measurement Uncertainty

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

Parameter	Uncertainty
Total Luminous Flux (%)	$\pm 3.25$
Luminous Intensity (%)	$\pm 3.25$
Correlated Color Temperature (K)	$\pm 100$
CRI	$\pm 2$
Chromaticity x	$\pm 0.005$
Chromaticity y	$\pm 0.005$
Temperature (°C)	$\pm 0.5$
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.

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

### Notes

The polar plot in the above report has been created by measuring the lower lobe of the item's light distribution and mirroring this to create the upper lobe. This is to give a complete polar plot of the test item's light distribution, based on the symmetry of the test item's luminous opening. This was done due to the wide distribution of light from the test item, causing some light to be blocked by the Goniophotometer system.

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