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PHOTOMETRIC  
TEST REPORT

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## Photometric Test Report

Report Number: POTS/GJ13278	Report Date: 29-07-2013	Prepared By: G John
Test Laboratory: Photometric and Optical Testing Services, Cotswold Business Centre, 42 A P Ellis Road, Rissington Business Park, Upper Rissington, Gloucestershire, GL54 2QB		
Company Registration Number: Registered in England & Wales No. OC352911		
Registered Address: Thistle Down Barn, Holcot Lane, Sywell, Northampton, NN6 0BG		

### Client Details

Company: Astro Lighting	Email: technical@astrolighting.co.uk
Address: Astro Lighting Limited, G2 River Way, Harlow CM20 2DP, Great Britain	

### Details of Product Tested

Manufacturer: Astro Lighting	Source Type: Domestic light
Model: TOSCA LED	Serial Number: 1157003
Lamp Type: LED	
Power Supply Used: Uninterruptible AC power supply	
Voltage(AC V) = 243.5	Current (mA)= 23
Power (Watts)= 2.23	Power factor= 0.41

### Integrating Sphere Test

Date of Test: 19-07-2013	Ambient Temperature: 25°C
Measurement Filename: TOSCA LED	
Instrument Used: Labsphere model CSLMS HALOGEN 4060 integrating sphere spectroradiometer	
Integrating Sphere Size: 1m	Measurement Geometry ( $2\pi / 4\pi$ ): $2\pi$
Sample Orientation: Horizontal	Auxiliary Correction Applied: YES
Comments:	
Date of Last Calibration (Operating Hours): 02-05-2013 (02:42)	Spectral Flux Standard Lamp Used: SCL-1400
Standard Lamp Serial Number: K75	Traceable: to NIST standards
Calibration Certificate Number: DM-02008-001	Calibration Certificate Date: 19 <sup>th</sup> February 2010
Calibration Lamp Uncertainty: $\pm 0.67\%$ ( $k=2$ )	
<b>Results</b>	
Flux (lumens): 61.13	
CIE 1931 Chromaticity Cx: 0.4687	CIE 1931 Chromaticity Cy: 0.4122
CRI (%): 85.65	CCT (K): 2592

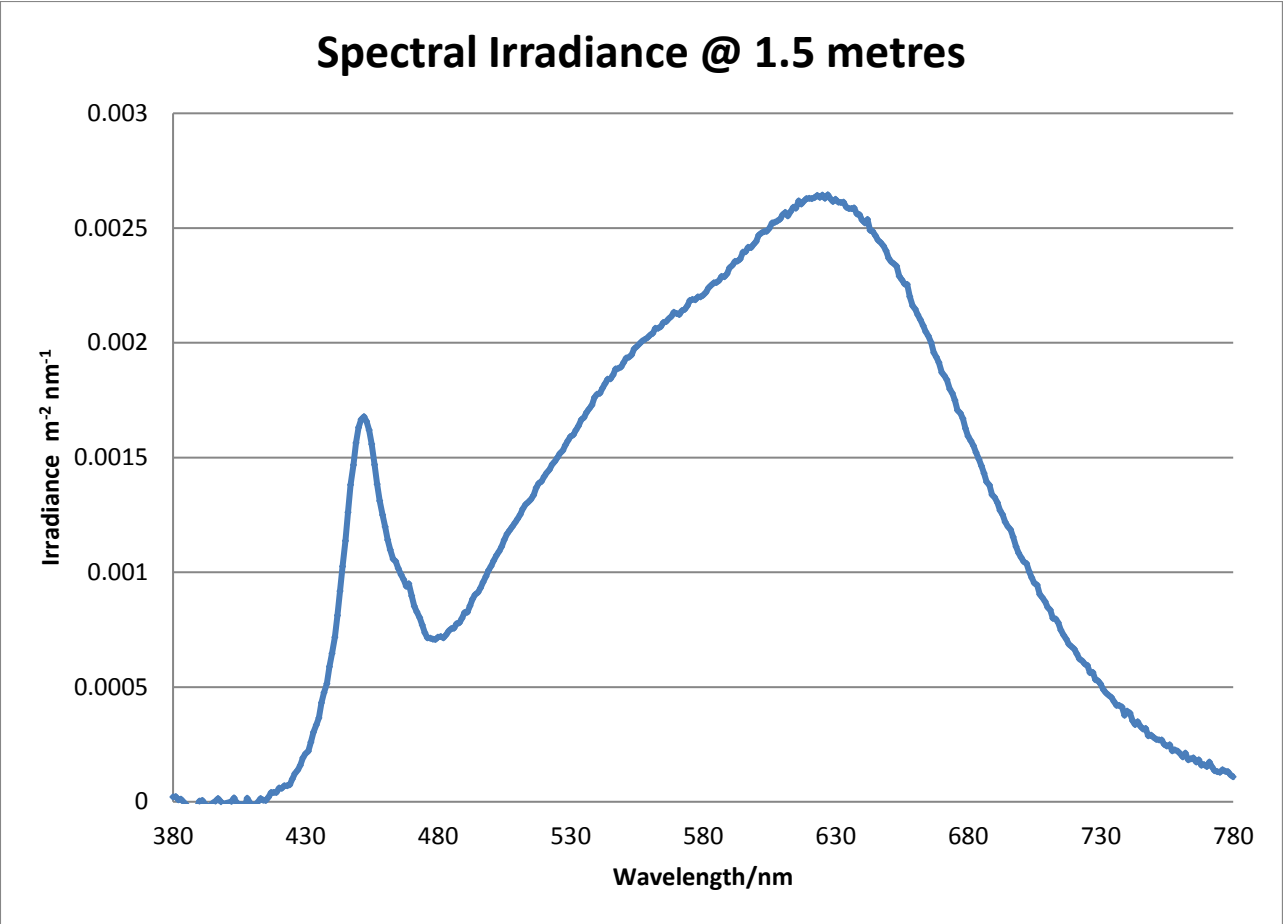


Figure 1: Spectral Irradiance

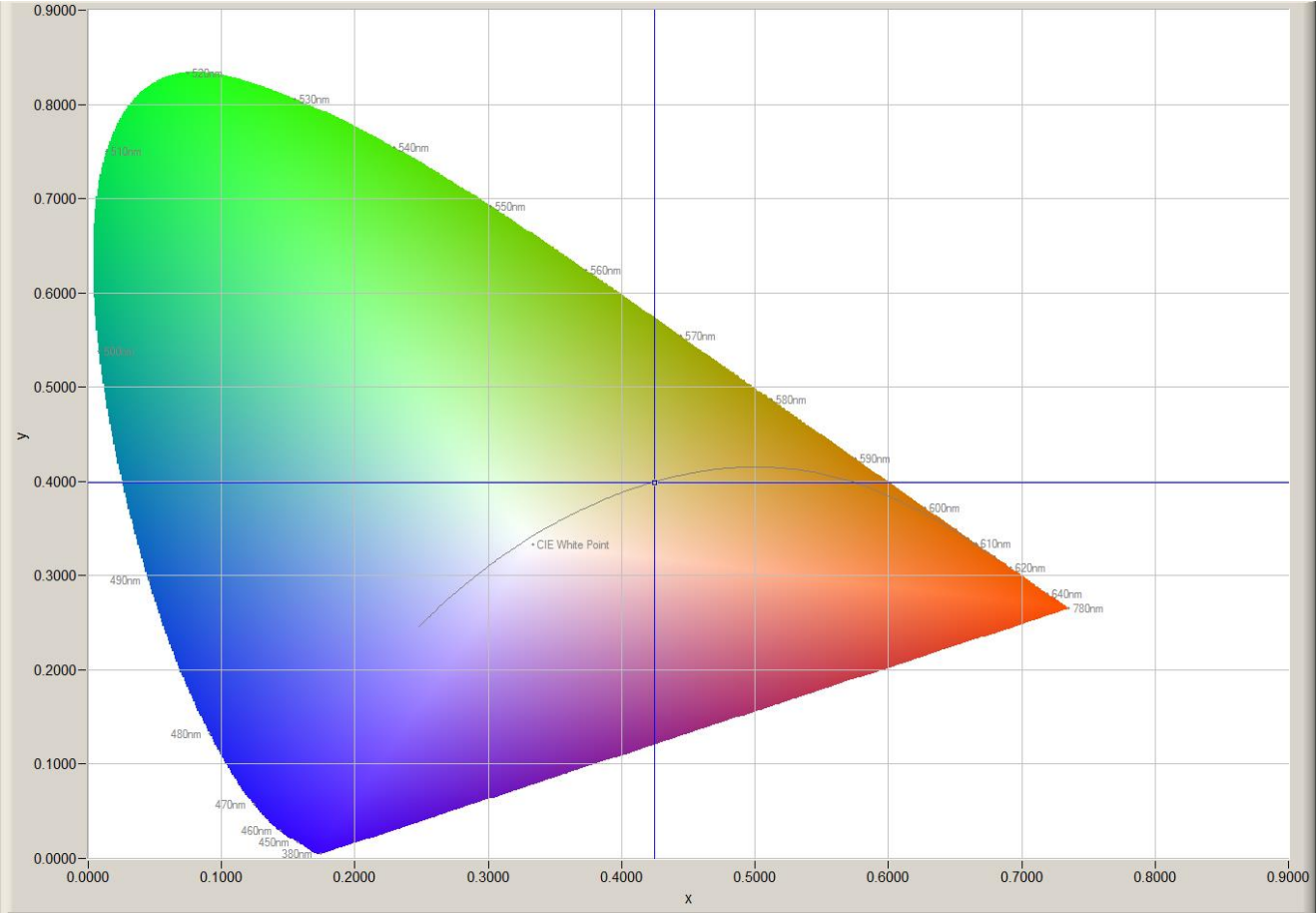


Figure 2: CIE 1931 diagram.

Goniophotometer Test		
Date of Test: 26-07-2013		Ambient Temperature: 25°C
Measurement Filename: TOSCA LED		
Instrument Used: Radiant Imaging NFMS0800 Goniometer with ProMetric PM-1200N-1 Imaging Photometer		
Photometer Working Distance: 1.5 m		Measurement Geometry: Near-Field
Comments:		
Reference Photometer Used: Specbos1201		Reference Photometer Serial Number: 2911670
Traceable: to NPL standards, UKAS Accredited		Calibration Certificate Number: 13201
Calibration Certificate Date: 15 <sup>th</sup> March 2013		Sample Stabilisation Time (minutes): 45
Reference Photometer Calibration Uncertainty: $\pm 2.4\%$ ( $k=2$ , 20-200 lux, CIE illuminant A source)		
Scan Set Up		
Direction	Range	Increment
Inclination Zone 1	0-90°	3°
Azimuth	0-360°	10°
Results		
Integrated Luminous Flux (lumens): 61.13	Peak Intensity (3° Spot, candelas): 297.5	Efficacy (lumens/Watt): 27.41
Beam Angle (50% of max intensity C0-180, degrees): 25.5		
Photometric Filename (IES LM-63-2002): TOSCA LED		
IES File – Absolute or Relative Format? Absolute		
Photometric Filename (EULUMDAT): TOSCA LED		
EULUMDAT File – Absolute or Relative Format? Absolute		

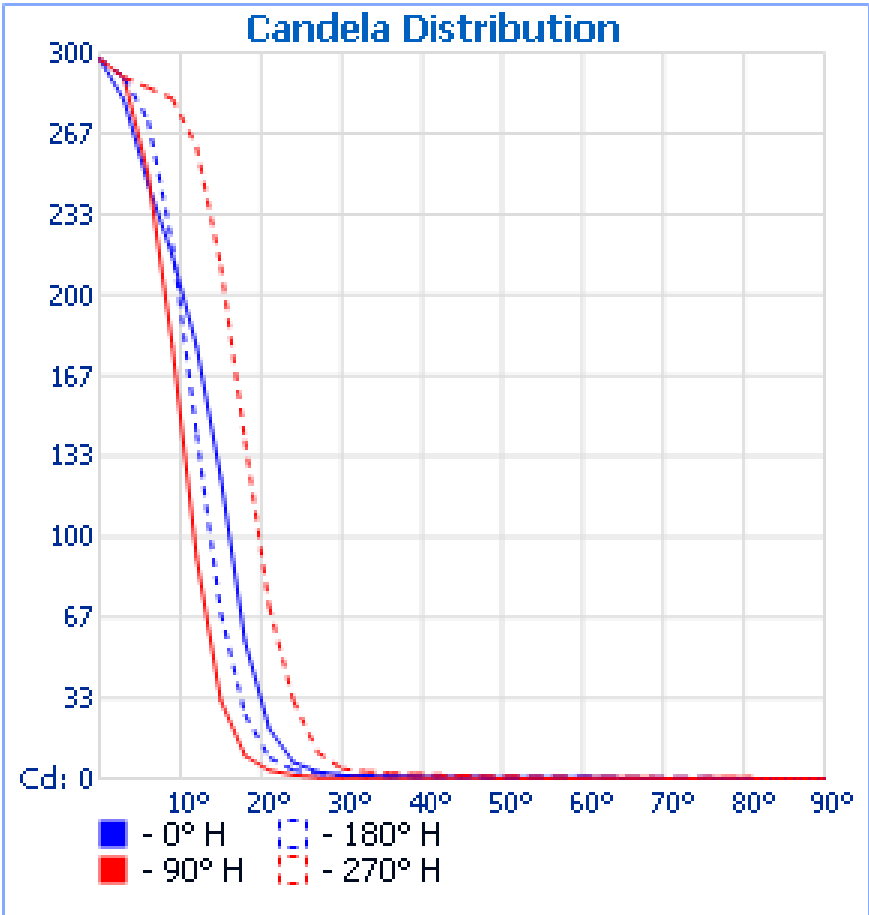


Figure 3: Far-Field Luminous Intensity (C0-180, Cartesian Coordinates)

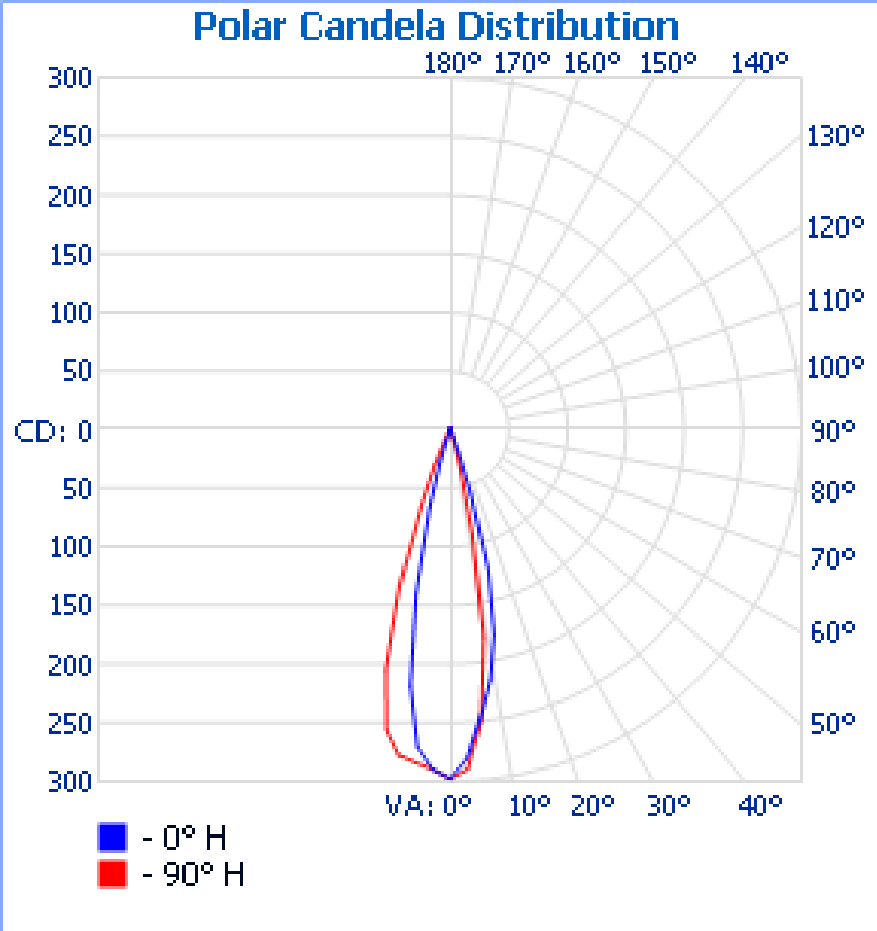


Figure 4: Far-Field Luminous Intensity (C0-180, C90-270, Polar Coordinates)

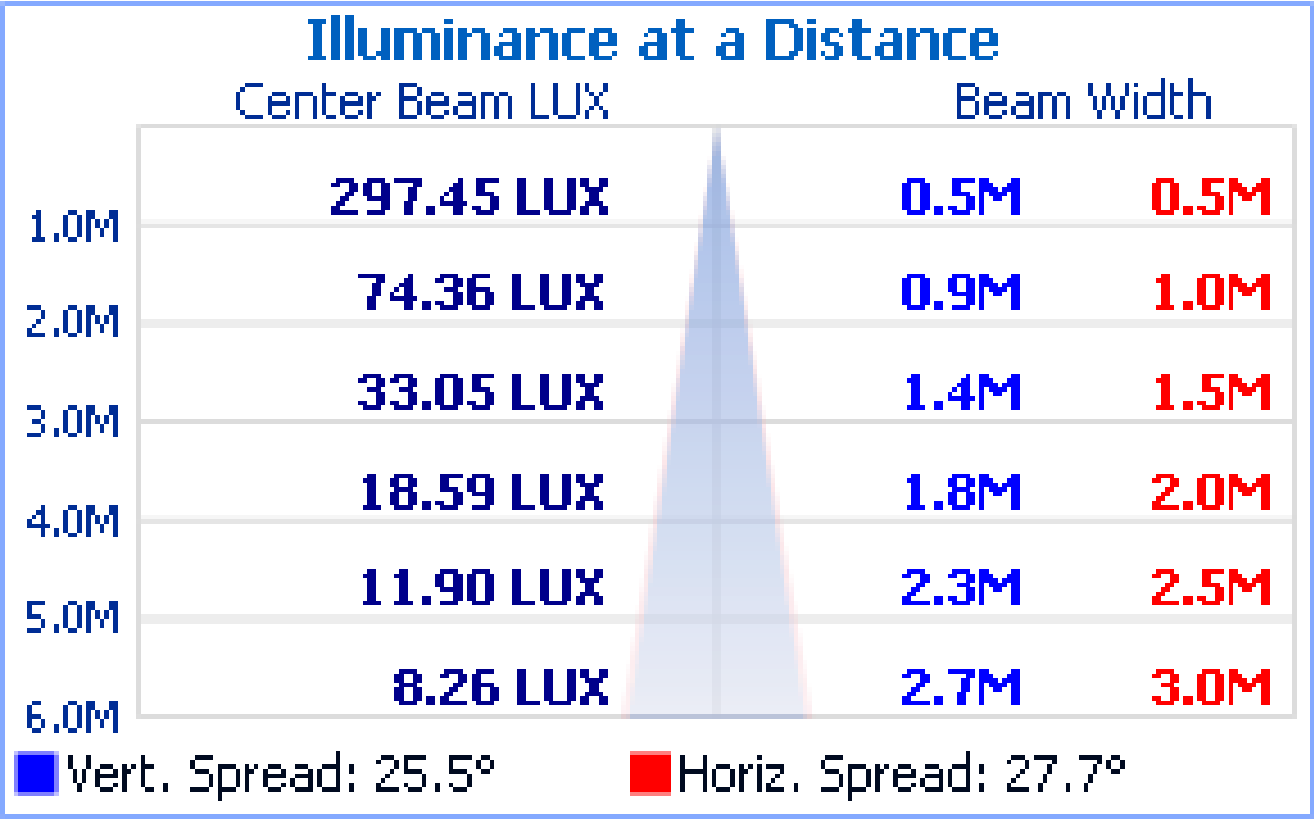


Figure 4. Illuminance cone diagram.

Reflectance of											
Ceiling		0.7	0.7	0.5	0.5	0.3	0.7	0.7	0.5	0.5	0.3
Wall		0.5	0.3	0.5	0.3	0.3	0.5	0.3	0.5	0.3	0.3
Floor Cavity		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Room dimension		View endwise (C0)					View crosswise (C90)				
x	y										
2H	2H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	3H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	4H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	6H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	8H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	12H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
4H	2H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	3H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	4H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	6H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	8H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	12H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
8H	4H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	6H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	8H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	12H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
12H	4H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	6H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
	8H	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0

Table 1. UGR values

	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297
3	280	281	281	285	285	287	288	289	289	290	289	289	288	288	288	289	288	289	290
6	246	246	250	252	252	252	254	253	251	250	247	245	244	243	247	253	259	263	272
9	216	209	207	201	198	196	194	190	185	179	173	167	163	162	165	172	189	201	221
12	179	168	158	148	143	130	118	107	99	91	85	81	82	85	92	94	105	120	143
15	125	106	93	76	64	56	47	42	35	32	30	30	30	34	37	41	49	55	69
18	57	48	34	28	21	17	14	13	11	10	10	9	9	11	12	14	17	23	27
21	21	17	12	9	7	5	5	5	4	4	3	3	3	3	4	5	6	8	9
24	7	6	4	3	2	2	2	2	2	2	2	1	1	2	2	2	3	4	4
27	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2
30	2	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	2
33	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0	1	1	1
36	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1
39	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
42	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
45	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
48	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1
51	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1
54	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1
57	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1
60	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
63	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
66	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
69	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
72	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
75	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
87	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

Table 2a. Luminous intensity values, azimuth 0-180°

	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350
<b>0</b>	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297
<b>3</b>	290	290	290	290	290	289	290	290	290	290	289	288	286	284	284	279	280
<b>6</b>	279	287	291	293	292	290	288	286	286	285	285	282	277	270	262	253	246
<b>9</b>	236	258	269	281	287	288	286	283	281	280	280	280	278	271	255	239	223
<b>12</b>	162	183	207	233	246	255	259	261	261	260	259	261	261	256	235	210	190
<b>15</b>	80	102	122	144	168	182	197	205	212	211	212	210	210	201	186	163	138
<b>18</b>	35	42	56	66	84	99	117	134	140	143	139	133	129	118	109	87	75
<b>21</b>	12	15	21	28	35	46	59	68	71	73	73	68	62	56	49	37	28
<b>24</b>	4	5	6	8	11	16	24	30	32	31	31	29	27	22	17	14	10
<b>27</b>	3	2	3	3	4	5	8	10	11	10	10	10	10	9	7	5	4
<b>30</b>	2	1	2	2	2	2	3	4	4	3	4	4	4	4	3	3	2
<b>33</b>	2	1	2	2	2	2	2	3	3	2	3	3	3	4	2	2	1
<b>36</b>	1	1	1	2	1	2	2	3	2	2	2	2	2	3	2	2	1
<b>39</b>	1	1	1	1	1	1	2	2	2	1	2	2	2	3	2	2	1
<b>42</b>	1	1	1	1	1	1	1	2	2	1	1	2	2	3	2	2	1
<b>45</b>	1	1	1	1	1	1	1	2	1	1	1	1	1	2	1	1	1
<b>48</b>	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1
<b>51</b>	1	0	1	1	1	1	1	1	1	0	1	1	1	2	1	1	1
<b>54</b>	1	0	1	1	1	1	1	1	1	0	1	1	1	2	1	1	1
<b>57</b>	1	0	1	1	1	1	1	1	1	0	1	1	1	2	1	1	1
<b>60</b>	1	0	1	1	1	1	1	1	1	0	1	1	1	2	1	1	1
<b>63</b>	1	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0
<b>66</b>	1	0	0	1	0	1	1	1	1	0	1	1	1	1	1	1	0
<b>69</b>	1	0	0	1	0	1	1	1	1	0	1	0	1	1	1	1	0
<b>72</b>	1	0	0	1	0	1	1	1	0	0	1	0	1	1	1	1	0
<b>75</b>	1	0	0	0	0	1	1	1	0	0	1	0	1	1	1	1	0
<b>78</b>	1	0	0	0	0	1	1	0	0	0	1	0	1	1	1	1	0
<b>81</b>	1	0	0	0	0	1	1	0	0	0	1	0	1	1	1	1	0
<b>84</b>	0	0	0	0	0	0	1	0	0	0	1	0	1	1	1	0	0
<b>87</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
<b>90</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2b. Luminous intensity values, azimuth 190-350°



Signature:



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Print Name:

GH JOHN

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Date:

\_\_29-07-2013\_\_

Partner / Director

*Duly authorised to sign on behalf of:*

Photometric and Optical Testing Services LLP