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PHOTOMETRIC  
TEST REPORT

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## Photometric Test Report

Report Number: POTS/GJ13026	Report Date: 29-01-2013	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: TALLIN 900	Serial Number: 1116003
Lamp Type: CFL	
Power Supply Used: Uninterruptible AC power supply	
Voltage(AC V) = 244.7	Current (mA)= 155
Power (Watts)= 37.4	Power factor= 0.9852

### Integrating Sphere Test

Date of Test: 19-12-2012	Ambient Temperature: 25°C
Measurement Filename: TALLIN 900	
Instrument Used: Labsphere model CSLMS LED 4060 integrating sphere spectroradiometer	
Integrating Sphere Size: 1m	Measurement Geometry (2 / 4 ): 4
Sample Orientation: Horizontal	Auxiliary Correction Applied: YES
Comments:	
Date of Last Calibration (Operating Hours): 08-11-2012 (02:36)	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): 1041.6	Bare Lamp flux (lumens): 3200
CIE 1931 Chromaticity Cx: 0.3129	CIE 1931 Chromaticity Cy: 0.4164
CRI (%): 79.35	CCT (K): 3129
LOR(%)= 32.55	

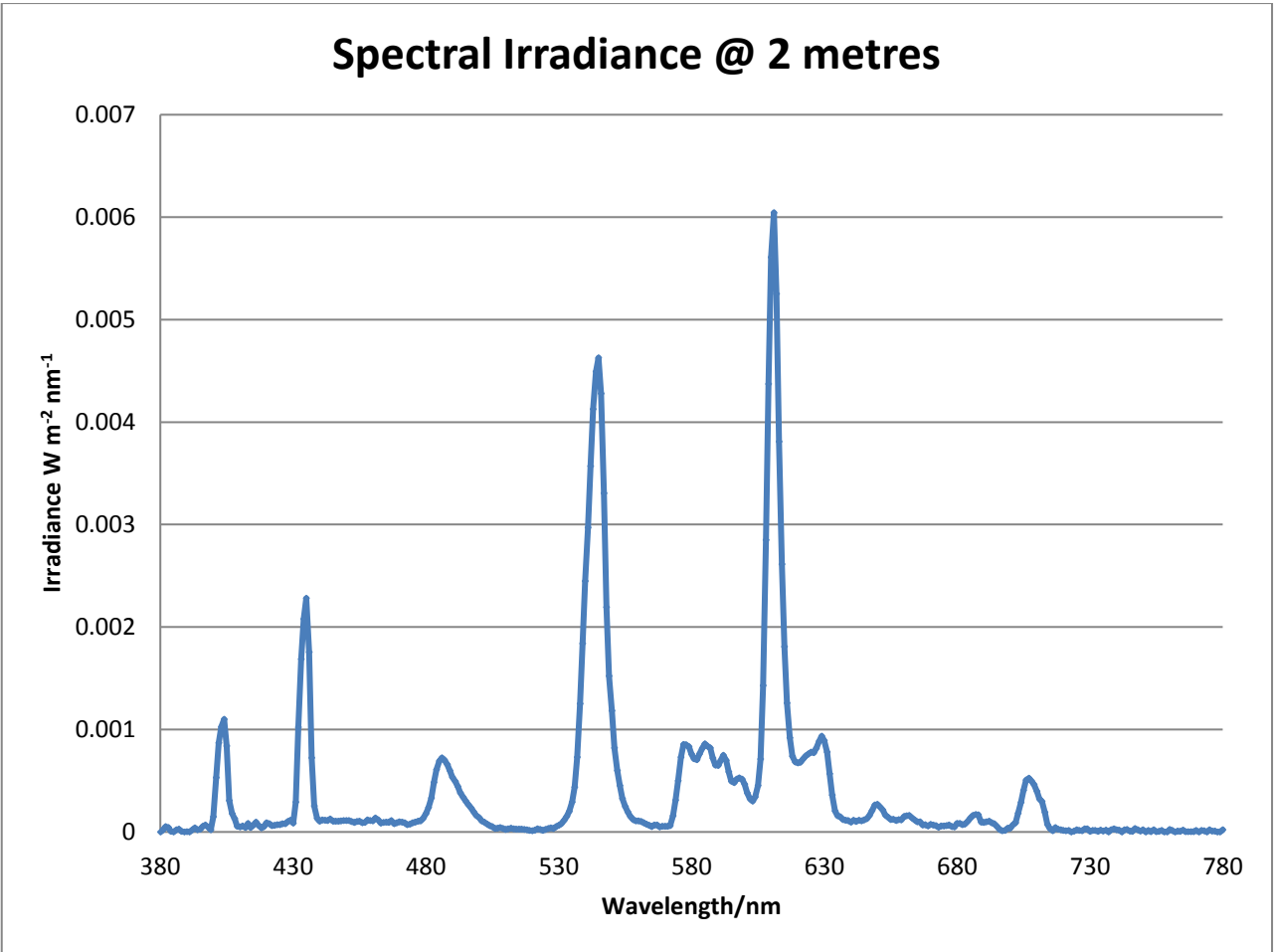


Figure 1: Spectral Irradiance

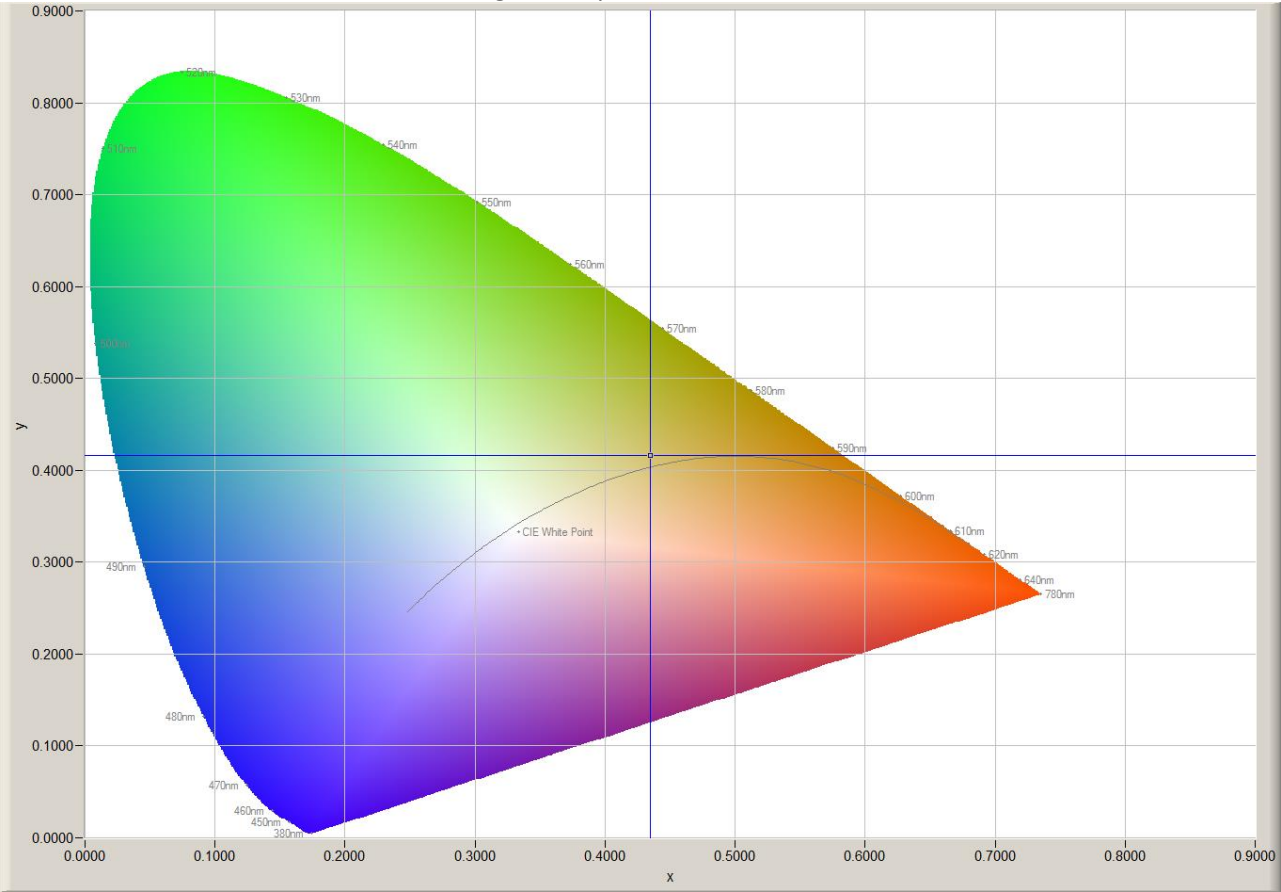


Figure 2: CIE 1931 diagram.

Goniophotometer Test		
Date of Test: 19-12-2012		Ambient Temperature: 25°C
Measurement Filename: TALLIN 900		
Instrument Used: Radiant Imaging NFMS0800 Goniometer with ProMetric PM-1423F-1 Imaging Photometer		
Photometer Working Distance: 2m		Measurement Geometry: Near-Field
Comments:		
Reference Photometer Used: Specbos1201		Reference Photometer Serial Number: 2911670
Traceable: to NPL standards, UKAS Accredited		Calibration Certificate Number: 121104
Calibration Certificate Date: 25 <sup>th</sup> October 2011		Sample Stabilisation Time (minutes):35
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	0-180°	3°
Azimuth	0-360°	10°
Results		
Integrated Luminous Flux (lumens):1041.6	Peak Intensity (3° Spot, candelas): 200.8	Efficacy (lumens/Watt): 27.83
Beam Angle (50% of max intensity C0-180, degrees): 108.6		
Photometric Filename (IES LM-63-2002): TALLIN 900		
IES File – Absolute or Relative Format? Relative		
Photometric Filename (EULUMDAT): TALLIN 900		
EULUMDAT File – Absolute or Relative Format? Relative		

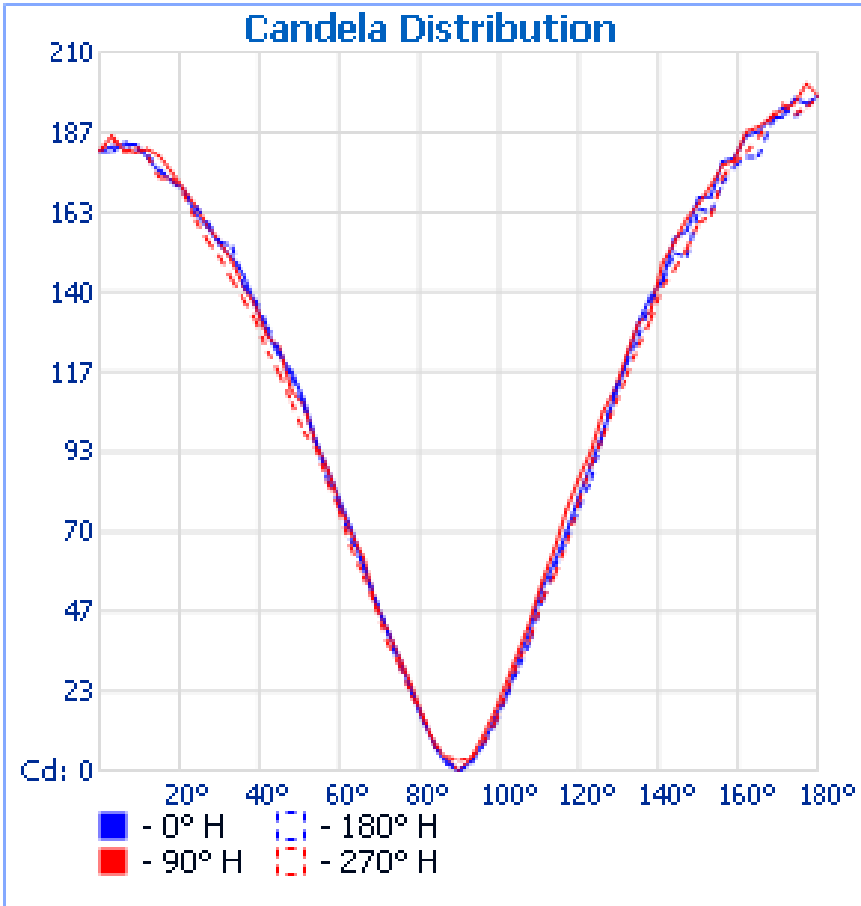


Figure 3: Far-Field Luminous Intensity (C0-180, Cartesian Coordinates)

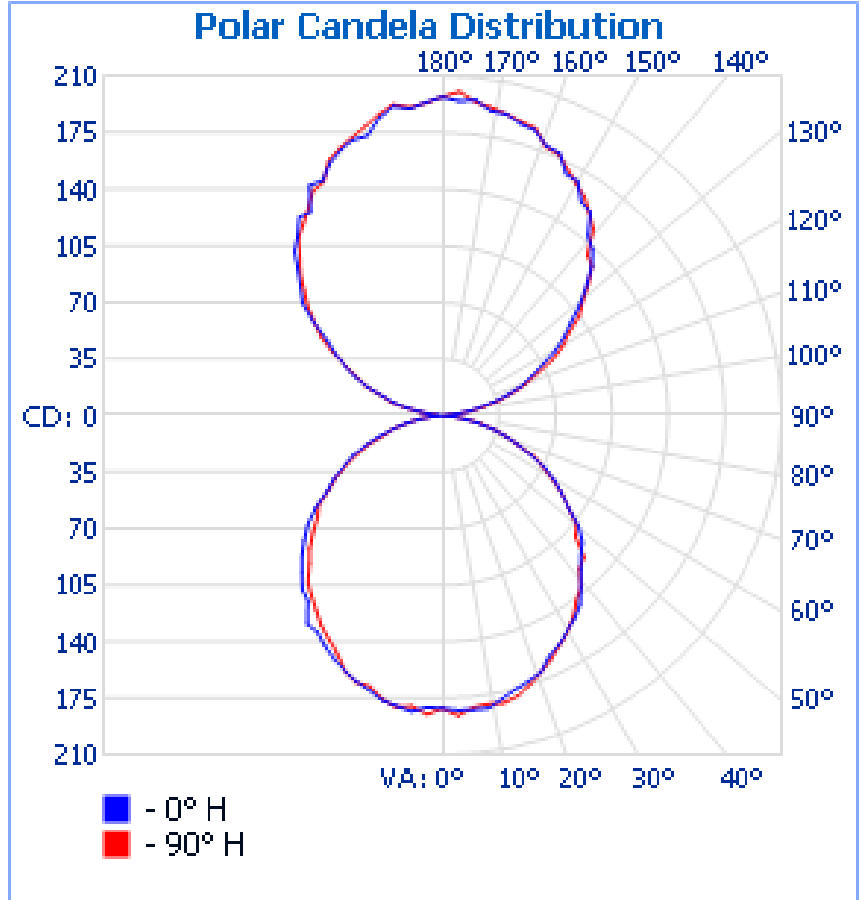


Figure 4: Far-Field Luminous Intensity (C0-180, C90-270, Polar Coordinates)

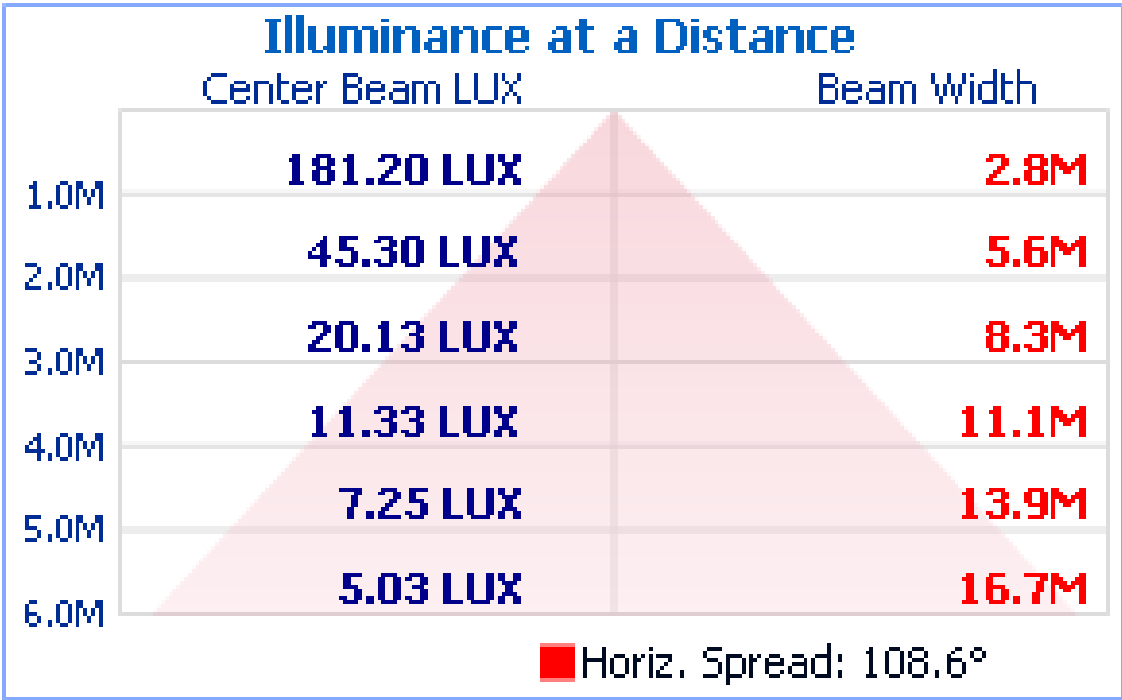


Figure 4. Illuminance cone diagram.

Reflectance of											
Ceiling		0.7	0.7	0.5	0.5	0.3	0.7	0.7	0.5	0.5	0.3
Walls		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		Viewed crosswise					Viewed endwise				
x	y										
2H	2H	14.3	15.1	15.2	16.1	17.4	13.9	14.8	14.9	15.8	17.1
	3H	15.7	16.5	16.7	17.5	18.8	15.4	16.2	16.4	17.2	18.5
	4H	16.3	17.0	17.3	18.0	19.3	16.0	16.7	17.0	17.7	19.0
	6H	16.6	17.3	17.6	18.3	19.6	16.4	17.0	17.3	18.0	19.4
	8H	16.7	17.3	17.7	18.3	19.7	16.4	17.1	17.4	18.1	19.4
	12H	16.7	17.3	17.7	18.3	19.6	16.5	17.1	17.5	18.1	19.4
4H	2H	14.9	15.6	15.9	16.6	17.9	14.6	15.3	15.6	16.3	17.6
	3H	16.5	17.1	17.5	18.1	19.4	16.2	16.9	17.2	17.9	19.2
	4H	17.2	17.7	18.2	18.8	20.1	16.9	17.5	17.9	18.5	19.9
	6H	17.6	18.1	18.6	19.1	20.5	17.3	17.8	18.4	18.9	20.2
	8H	17.7	18.1	18.7	19.2	20.5	17.5	17.9	18.5	19.0	20.3
	12H	17.7	18.2	18.8	19.2	20.6	17.6	18.0	18.6	19.0	20.4
8H	4H	17.4	17.8	18.4	18.9	20.2	17.1	17.6	18.2	18.6	20.0
	6H	17.9	18.3	18.9	19.3	20.7	17.7	18.0	18.7	19.1	20.5
	8H	18.1	18.4	19.2	19.5	20.9	17.9	18.2	19.0	19.3	20.7
	12H	18.1	18.4	19.2	19.5	20.9	18.0	18.3	19.1	19.3	20.7
12H	4H	17.4	17.8	18.4	18.8	20.2	17.2	17.6	18.2	18.6	20.0
	6H	18.0	18.3	19.0	19.3	20.7	17.7	18.1	18.8	19.1	20.5
	8H	18.1	18.4	19.2	19.5	20.8	17.9	18.2	19.0	19.3	20.7

Table 1. UGR values

	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2
3	182.6	182.9	183.3	184.0	183.7	184.0	185.1	185.4	185.8	185.8	186.2	186.2	185.8	184.7	182.9	182.2	182.2	181.2	180.8
6	182.9	181.2	182.6	184.4	184.0	182.9	182.9	180.1	178.7	181.5	185.4	186.5	184.0	182.2	179.7	179.7	185.1	186.9	184.0
9	183.3	180.8	184.4	182.9	181.9	182.9	183.3	181.2	181.5	180.8	180.8	181.2	183.3	182.9	182.2	182.2	181.2	185.8	181.9
12	179.0	181.9	179.4	179.4	178.7	180.8	180.8	179.7	180.1	181.9	181.5	178.7	179.4	181.5	178.3	181.2	180.1	179.4	180.1
15	175.1	177.2	173.3	179.0	175.8	176.1	177.6	178.3	174.7	179.7	175.4	174.4	179.0	176.1	175.8	172.2	175.8	171.1	175.8
18	172.6	175.4	170.4	175.8	172.6	178.3	171.9	175.8	176.1	175.1	177.2	173.3	174.4	170.8	173.3	171.9	171.9	170.1	172.6
21	170.1	168.3	170.1	167.2	172.9	169.0	172.6	168.6	172.6	170.1	166.5	171.5	169.7	165.1	170.4	166.5	172.6	161.1	169.0
24	162.9	166.9	165.4	167.9	163.6	162.9	164.4	168.3	164.0	165.1	164.0	167.2	164.0	163.6	162.9	158.6	163.6	160.4	165.1
27	159.0	165.8	158.3	158.6	166.5	160.1	160.4	164.0	157.9	159.4	160.1	158.3	156.1	159.7	159.0	161.1	161.1	155.1	160.4
30	154.0	157.2	157.2	155.8	152.6	159.0	157.2	153.3	155.8	154.7	153.3	155.8	153.6	152.6	153.6	152.9	152.9	150.4	154.7
33	150.1	150.8	147.6	150.4	151.9	150.1	145.8	148.6	149.0	149.0	147.6	148.3	146.5	146.9	147.9	149.0	143.6	139.7	153.6
36	145.1	145.1	144.3	148.3	141.8	144.7	144.3	144.0	142.6	141.5	141.1	140.8	140.8	137.6	143.6	144.7	139.3	136.5	141.8
39	136.5	139.0	140.1	135.4	135.8	138.3	136.8	133.3	137.6	136.5	138.6	134.0	133.3	135.4	136.8	134.7	129.7	132.2	137.9
42	128.3	130.1	128.6	131.5	132.2	129.3	129.0	126.8	129.3	127.2	127.9	127.9	126.1	129.0	126.1	125.4	122.6	123.3	130.1
45	121.5	121.8	123.6	119.3	122.6	122.6	122.2	121.8	119.0	124.0	120.1	118.3	119.7	119.7	121.1	116.5	114.3	117.9	122.9
48	116.8	113.3	116.5	115.8	114.0	113.6	115.1	115.1	112.9	111.1	109.3	115.8	116.1	114.7	108.3	110.8	108.6	110.8	115.1
51	108.6	106.8	102.9	107.5	102.9	104.7	105.4	106.5	106.5	107.2	107.5	106.1	106.8	106.1	102.2	99.0	99.3	102.5	107.2
54	96.5	96.5	98.3	98.3	96.5	98.6	98.6	99.0	96.1	96.1	96.5	96.5	96.5	91.8	94.3	90.0	92.9	95.0	96.8
57	87.9	87.9	86.1	91.1	91.1	90.8	86.8	90.8	87.9	87.9	87.5	88.3	87.2	87.5	82.9	81.1	82.9	85.8	85.0
60	79.7	78.6	78.6	80.4	81.8	78.6	77.5	78.2	80.4	78.6	76.5	79.0	76.8	74.0	75.0	72.9	74.3	77.5	77.9
63	71.1	72.5	71.8	71.5	66.8	69.3	71.1	69.0	70.0	69.7	72.2	71.5	68.2	66.1	67.5	67.9	69.7	67.5	67.9
66	60.4	61.8	60.0	62.2	58.6	60.7	60.4	61.1	62.5	62.9	60.0	60.4	57.5	55.7	57.5	59.0	59.0	57.5	60.4
69	49.7	49.3	49.0	50.7	50.0	51.5	53.2	51.5	51.5	49.3	49.7	50.4	49.0	49.7	50.0	47.5	48.2	50.0	50.7
72	41.4	42.2	41.8	42.5	40.7	40.4	41.8	40.7	43.6	41.4	42.2	42.2	41.1	41.4	40.7	38.9	41.1	41.1	41.4
75	33.2	31.4	33.2	32.2	30.7	32.9	32.5	34.3	32.9	33.2	32.9	32.9	33.2	32.5	31.4	30.0	31.1	31.4	31.1
78	23.6	22.5	22.5	24.7	22.9	23.6	23.6	24.3	24.3	25.0	23.9	23.6	23.6	22.5	23.9	23.6	21.8	21.8	23.2
81	14.6	13.9	15.7	15.7	15.0	15.0	15.0	16.8	15.0	15.4	16.8	15.7	16.8	15.7	16.4	15.7	15.7	15.0	15.0
84	7.5	7.5	7.5	8.6	8.6	8.6	8.9	8.6	8.2	7.5	9.3	8.6	8.2	8.6	7.9	8.9	7.5	7.1	7.9
87	2.1	2.5	3.2	3.6	3.2	3.2	4.3	2.5	3.2	3.9	3.2	3.2	2.5	2.9	3.2	2.9	2.5	3.2	2.9

90	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
93	2.9	3.6	3.6	3.2	3.2	2.9	3.2	3.9	3.9	3.6	3.9	4.3	3.9	3.6	2.9	2.9	2.1	2.9	2.1
96	7.9	8.6	7.1	8.6	8.6	8.9	8.9	9.6	10.7	10.4	10.4	10.0	8.9	9.6	7.5	8.9	7.5	7.1	7.9
99	15.7	14.3	16.1	15.4	15.0	16.8	16.4	16.8	18.2	17.5	16.4	18.2	17.5	16.4	17.2	16.1	15.7	13.6	13.9
102	22.9	23.6	24.7	23.6	24.7	25.0	25.4	26.1	25.4	26.4	26.1	26.4	24.7	24.3	24.7	24.7	22.5	20.7	22.2
105	33.2	31.4	32.5	33.6	33.2	34.3	35.4	36.1	35.4	35.7	34.3	35.7	35.4	36.4	32.9	33.2	31.1	31.1	30.7
108	42.2	41.1	42.2	43.2	40.7	45.7	43.6	44.3	44.7	44.7	46.4	47.5	45.7	45.0	42.9	42.5	40.4	41.8	38.6
111	53.6	52.2	52.5	49.0	51.1	54.3	52.2	54.0	53.6	55.4	55.7	55.0	56.8	55.0	51.8	52.2	49.0	49.3	50.0
114	61.1	61.1	60.4	60.0	61.8	60.4	64.3	64.0	63.6	65.0	64.3	63.2	64.7	61.8	59.0	61.1	61.1	59.3	59.3
117	70.0	68.6	70.4	69.0	71.5	70.4	72.2	73.2	73.2	76.5	75.4	75.7	75.0	71.8	72.9	74.3	70.7	71.1	67.9
120	80.0	81.1	82.5	77.9	79.3	80.7	84.0	84.3	86.5	85.4	84.0	82.9	85.4	85.4	84.3	81.5	81.1	77.2	76.8
123	89.3	88.6	87.9	86.1	87.5	91.1	90.4	95.0	94.3	93.3	94.3	91.8	93.6	95.4	93.3	92.2	92.5	89.3	85.0
126	99.0	96.1	97.9	95.0	97.9	101.1	101.1	101.5	105.4	105.0	100.4	104.7	103.3	101.5	100.4	101.5	102.9	99.3	98.6
129	109.7	107.2	106.1	106.5	106.5	109.3	113.3	113.6	115.8	111.5	110.8	114.7	112.5	114.0	110.4	110.8	106.1	111.1	111.5
132	120.1	114.0	110.4	114.0	115.4	120.1	120.1	121.1	124.7	121.5	119.7	122.2	117.9	122.9	121.1	119.3	121.8	117.2	118.6
135	130.8	122.2	118.6	122.2	125.4	130.4	130.4	127.6	130.8	130.8	131.1	130.4	130.8	128.3	129.0	126.1	127.9	126.1	126.8
138	138.6	130.4	127.6	132.6	136.8	135.1	135.1	137.2	137.6	134.3	137.2	137.9	140.8	137.6	135.1	135.4	135.8	134.7	137.2
141	143.3	136.1	135.8	143.6	144.0	139.7	139.3	145.1	146.9	148.3	147.2	146.9	142.9	145.1	144.0	141.1	145.1	144.7	142.9
144	155.8	147.6	142.6	154.4	151.1	145.4	149.4	152.6	151.9	154.7	152.9	152.2	154.0	150.8	150.8	151.5	149.4	150.1	151.5
147	157.9	150.1	153.3	156.5	158.6	153.3	156.5	159.4	156.1	161.5	159.7	159.4	159.4	156.5	157.6	156.9	157.2	157.6	150.1
150	167.6	155.1	162.6	169.4	160.1	162.2	167.6	162.9	169.0	165.8	167.9	166.1	164.0	164.4	160.4	160.8	161.5	161.1	164.4
153	167.9	165.8	171.5	171.5	163.6	172.2	169.7	171.9	172.9	171.1	174.0	171.1	172.6	168.6	170.4	167.9	161.9	167.6	163.3
156	177.9	165.1	177.6	170.8	174.7	177.6	176.1	175.4	176.9	176.9	176.1	176.1	179.0	171.9	173.6	173.3	171.1	175.4	171.5
159	179.0	179.4	182.2	173.6	177.9	183.3	180.4	181.9	181.9	178.3	180.1	183.3	181.2	181.5	180.1	176.5	176.9	176.5	176.5
162	185.8	181.5	183.7	177.6	187.2	183.7	184.0	185.8	185.4	186.9	184.4	186.2	184.4	186.5	183.7	185.4	180.1	182.9	179.4
165	186.9	183.7	188.3	186.2	189.7	187.9	189.4	191.2	189.7	188.3	187.9	191.2	190.1	191.2	190.1	185.1	184.7	185.4	179.4
168	190.8	190.4	188.7	191.9	189.7	191.5	187.9	192.2	192.9	190.8	191.5	192.6	191.5	191.5	192.6	192.9	188.7	189.4	188.7
171	191.2	192.9	190.8	195.4	193.7	195.1	195.8	193.7	191.9	193.3	192.9	192.9	192.2	196.9	195.1	191.9	191.9	190.4	194.0
174	196.5	195.4	191.5	191.9	195.1	196.2	195.8	197.9	197.2	195.1	193.7	194.7	195.1	194.4	192.9	194.4	195.1	193.3	191.2



<b>177</b>	195.1	194.7	194.7	195.8	195.8	196.5	197.9	199.4	200.4	200.8	200.4	200.1	199.7	199.0	197.9	196.9	195.8	194.7	194.4
<b>180</b>	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2

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

	<b>190</b>	<b>200</b>	<b>210</b>	<b>220</b>	<b>230</b>	<b>240</b>	<b>250</b>	<b>260</b>	<b>270</b>	<b>280</b>	<b>290</b>	<b>300</b>	<b>310</b>	<b>320</b>	<b>330</b>	<b>340</b>	<b>350</b>
<b>0</b>	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2
<b>3</b>	181.2	182.9	184.7	185.8	186.9	186.5	185.8	185.1	185.1	184.7	184.7	184.7	185.8	186.5	186.2	184.0	182.9
<b>6</b>	182.9	184.4	182.6	181.2	181.5	184.0	184.7	183.3	180.8	177.9	179.0	182.9	182.9	181.5	180.4	183.3	185.1
<b>9</b>	180.4	182.9	183.3	183.7	182.2	180.1	179.0	181.9	182.6	179.4	181.5	182.6	181.5	181.2	181.9	181.2	182.2
<b>12</b>	176.1	177.2	174.4	181.2	176.9	176.9	181.2	179.7	179.7	179.4	176.9	181.2	176.9	176.9	181.9	176.9	182.6
<b>15</b>	176.1	175.8	170.4	174.4	176.5	173.3	174.0	171.5	173.3	176.5	176.9	173.3	173.6	176.1	176.5	174.0	175.1
<b>18</b>	171.1	170.4	172.2	165.4	171.5	167.9	172.6	172.9	173.3	169.0	170.4	172.6	173.6	172.6	166.9	175.8	172.9
<b>21</b>	168.3	165.4	168.6	164.7	166.9	163.3	168.3	162.9	169.0	165.1	169.0	167.6	168.3	165.4	168.6	167.6	163.3
<b>24</b>	160.8	156.9	165.1	155.4	162.2	157.9	161.1	160.8	161.1	160.1	161.9	164.4	159.0	164.4	162.2	163.6	164.7
<b>27</b>	157.9	153.3	160.4	156.9	154.0	158.6	155.1	154.0	155.1	158.3	155.8	155.1	160.4	153.3	156.9	159.7	159.0
<b>30</b>	154.7	148.3	153.6	153.6	144.7	150.1	154.0	149.4	150.1	150.8	151.1	150.1	146.9	156.1	155.1	150.4	150.4
<b>33</b>	151.1	144.3	146.5	148.6	142.6	140.8	144.7	144.7	143.6	140.4	143.6	143.3	147.9	146.5	142.6	146.9	149.0
<b>36</b>	145.4	136.5	138.3	141.5	141.8	134.7	138.6	141.8	137.9	138.3	136.5	136.8	136.5	142.2	141.5	139.7	145.1
<b>39</b>	139.3	132.6	129.0	132.9	131.1	129.3	125.8	131.1	132.2	129.7	132.9	134.3	131.5	127.9	135.1	136.8	137.2
<b>42</b>	130.1	127.6	122.2	121.5	127.9	127.2	120.8	123.3	122.9	126.5	126.8	122.9	125.4	125.8	127.6	125.8	130.1
<b>45</b>	123.6	123.6	116.8	114.3	116.8	117.6	112.9	115.1	116.1	115.8	115.8	114.3	116.8	117.9	123.3	120.8	121.8
<b>48</b>	118.3	111.5	108.6	107.2	108.3	109.7	110.0	107.9	107.9	106.5	109.3	111.1	107.5	112.2	111.5	112.2	115.1
<b>51</b>	108.3	103.6	101.5	99.3	100.8	101.1	99.0	101.8	99.3	101.8	99.7	101.5	98.6	101.1	102.5	103.3	109.0
<b>54</b>	97.9	99.3	92.2	91.5	90.0	91.5	93.6	92.2	95.0	94.0	93.3	91.5	94.3	94.0	92.5	97.5	98.6
<b>57</b>	86.5	91.8	85.4	84.7	82.2	81.8	82.5	84.3	84.3	84.7	86.5	88.3	86.1	87.2	85.0	87.9	87.5
<b>60</b>	79.3	78.6	75.0	76.1	74.3	72.2	75.4	74.3	76.5	77.2	77.2	72.9	74.7	80.0	75.0	75.7	77.2
<b>63</b>	68.6	71.1	67.5	66.5	65.4	62.2	66.8	66.5	65.7	66.1	66.1	66.8	68.2	66.5	67.5	71.8	70.0

66	59.3	57.5	58.6	59.3	59.0	57.2	58.6	58.6	57.2	58.6	57.9	57.9	57.2	57.9	61.5	58.6	61.1
69	51.5	48.2	47.9	50.0	49.7	46.4	49.7	49.3	48.6	47.9	49.0	50.4	48.2	47.9	47.5	47.9	49.7
72	42.9	40.7	40.4	42.5	40.7	40.7	38.6	41.1	37.9	39.3	39.7	41.4	39.7	39.7	40.7	40.0	40.4
75	31.8	31.4	31.4	33.2	30.7	32.5	30.4	30.4	31.1	31.8	30.7	31.8	32.5	32.2	31.4	32.2	31.4
78	22.5	22.5	23.2	22.9	24.3	22.5	22.2	22.2	22.2	21.8	21.4	21.8	22.2	22.9	21.8	23.6	22.9
81	14.6	15.7	15.4	14.6	15.4	15.4	15.7	14.3	15.7	14.6	13.9	13.6	14.6	14.3	13.9	15.0	13.9
84	8.2	8.6	8.9	7.5	8.6	8.6	8.6	8.2	8.2	8.9	7.5	8.6	7.1	6.8	7.5	7.1	7.5
87	3.6	2.9	2.9	3.6	4.3	3.6	3.6	4.3	4.3	4.3	3.6	3.2	3.2	2.9	2.5	2.5	3.2
90	0.0	1.1	0.0	2.1	2.9	2.5	3.2	2.9	3.2	3.2	2.9	2.5	1.8	1.4	0.0	0.0	1.1
93	3.2	3.6	3.2	3.2	3.6	4.3	3.6	4.3	3.9	3.6	3.6	3.2	2.5	2.5	3.2	2.5	3.6
96	7.5	7.5	8.6	8.6	8.6	7.9	7.5	8.6	8.2	8.2	7.9	7.1	7.1	7.1	7.1	7.1	8.9
99	14.3	15.0	16.1	16.4	15.4	14.3	15.7	15.4	14.3	13.9	14.3	15.0	15.0	14.3	14.6	14.3	14.3
102	22.2	22.9	23.6	23.9	23.9	23.6	22.9	23.2	23.6	22.2	20.7	21.4	21.4	23.2	21.8	21.8	22.9
105	29.3	30.7	31.1	31.8	32.5	29.3	32.5	32.5	32.9	31.4	30.4	29.7	31.4	30.4	30.4	29.7	32.2
108	40.0	38.6	40.4	40.7	39.3	40.4	39.3	40.4	39.3	38.2	38.6	38.9	42.2	40.4	38.6	39.3	41.8
111	47.2	49.0	50.0	51.1	48.2	49.3	48.2	47.5	50.4	50.7	47.2	48.2	49.3	49.3	48.6	48.2	50.4
114	61.8	60.0	62.5	60.7	59.0	58.6	60.4	60.0	57.2	56.1	57.5	57.2	57.9	58.6	60.4	60.4	61.5
117	69.3	70.4	71.1	71.1	72.5	68.6	67.9	70.0	66.8	66.8	66.1	67.5	67.2	69.3	69.3	72.5	68.6
120	76.5	77.9	81.8	80.7	78.2	79.0	81.1	80.0	78.6	77.2	76.5	76.5	76.1	77.2	78.6	82.2	79.7
123	87.2	89.3	87.5	90.8	90.0	87.9	88.6	88.3	89.3	85.4	84.3	86.5	86.1	88.3	86.8	92.9	89.0
126	102.5	102.5	96.8	97.2	97.2	94.7	98.3	95.8	97.9	96.1	94.0	91.8	94.3	94.3	97.5	101.8	99.7
129	114.0	108.6	107.2	105.8	105.0	101.5	102.2	106.5	107.2	107.5	105.0	101.8	105.0	106.5	107.5	111.8	111.1
132	119.7	119.0	116.8	116.1	110.8	113.3	117.2	116.5	115.1	114.0	114.7	111.5	111.5	112.9	117.6	122.2	123.3
135	126.8	127.6	129.7	124.0	119.7	119.3	119.7	120.4	124.3	121.1	120.1	122.6	124.7	123.3	121.5	122.9	130.8
138	137.9	132.9	130.4	130.4	127.9	126.1	130.1	132.6	131.8	129.0	126.5	127.9	131.1	129.7	125.1	133.6	139.3
141	144.0	142.9	138.3	134.0	135.1	137.6	140.8	139.7	141.5	137.2	135.1	137.9	139.7	140.4	134.7	137.9	142.2

<b>144</b>	148.3	145.8	149.4	146.1	145.1	141.8	145.8	145.4	146.5	148.6	144.0	144.7	147.2	150.1	146.5	142.2	152.6
<b>147</b>	154.4	154.4	148.6	149.0	154.7	151.9	155.1	154.0	152.6	152.2	152.6	149.0	151.1	157.6	152.6	148.6	159.7
<b>150</b>	158.6	154.7	158.3	161.1	155.1	158.6	161.9	161.9	160.4	157.9	163.3	155.8	154.7	163.6	161.9	156.5	167.2
<b>153</b>	165.1	169.4	161.5	162.6	165.4	162.9	166.9	168.6	162.2	171.9	164.4	169.0	162.2	160.1	168.3	164.4	167.2
<b>156</b>	169.7	168.3	165.4	171.5	167.6	169.4	172.6	170.1	173.3	172.2	172.6	170.4	170.1	169.7	177.2	167.6	171.5
<b>159</b>	177.9	172.2	172.2	174.0	174.7	174.0	180.1	180.8	177.6	174.7	177.9	174.4	177.9	175.1	174.7	176.1	173.6
<b>162</b>	178.7	179.4	176.1	180.8	181.9	179.7	181.9	180.4	180.8	182.6	184.7	178.7	180.4	181.2	182.9	182.9	183.3
<b>165</b>	184.4	184.7	184.0	185.8	181.2	186.2	183.3	182.9	185.1	187.6	185.8	182.9	183.7	184.0	183.3	182.2	183.7
<b>168</b>	189.7	186.2	192.9	190.4	190.1	189.4	186.5	187.2	190.8	189.0	190.1	187.2	190.4	189.7	185.4	190.8	187.2
<b>171</b>	194.4	188.3	188.3	189.4	187.2	192.6	191.5	191.2	195.1	193.3	188.7	191.5	190.4	188.7	190.4	194.0	191.5
<b>174</b>	191.5	194.0	195.4	195.4	194.0	192.2	192.2	191.5	191.9	192.9	191.9	194.4	196.5	195.1	193.7	191.5	192.6
<b>177</b>	194.0	193.7	191.9	191.9	193.3	194.7	195.4	195.1	194.0	193.3	194.0	195.4	196.5	196.9	197.2	196.2	195.4
<b>180</b>	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2	197.2

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

Signature:



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Print Name:

GH JOHN

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Date:

29-01-2013

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Partner / Director

*Duly authorised to sign on behalf of:*

Photometric and Optical Testing Services LLP