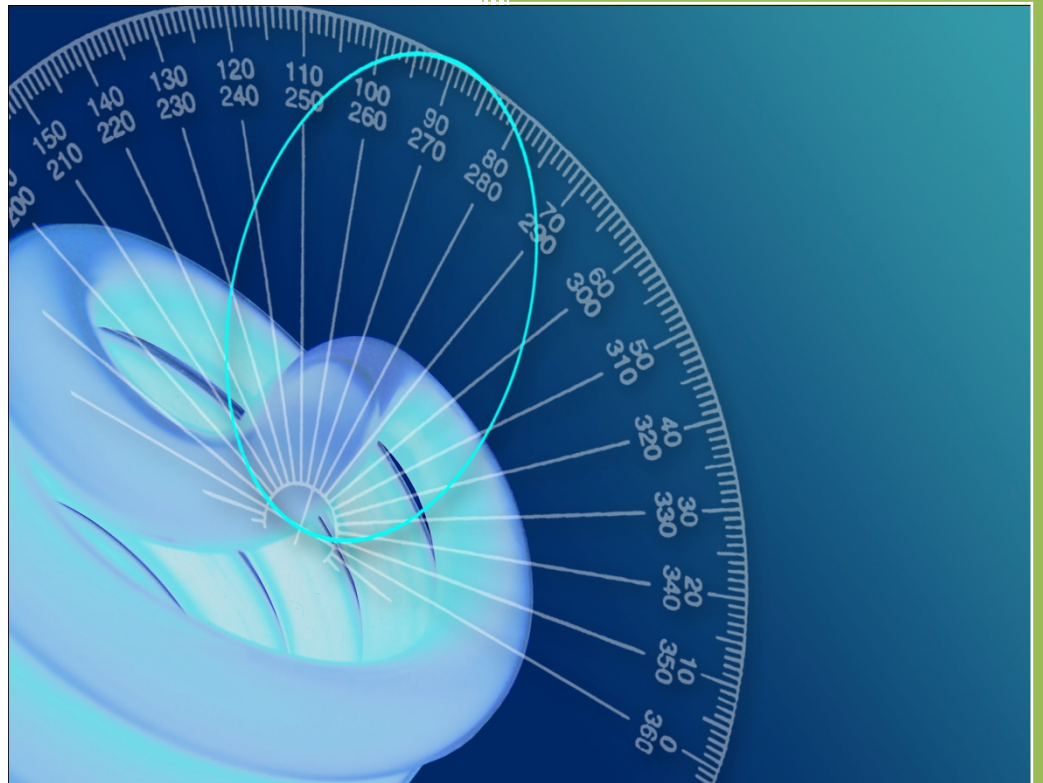


# Photometric Test Report



Photometric and Optical Testing  
Services  
Cheltenham Film and Photographic  
Studios  
Hatherley Lane  
Cheltenham  
Gloucestershire  
GL51 6PN  
UK  
Tel: 01242 701300

## Photometric Test Report

Report Number: POTS/DC18016	Report Date: 16/01/2018	Prepared By: D CHAMBERS
Test Laboratory: Photometric and Optical Testing Services, Cheltenham Film and Photographic Studios, Hatherley Lane, Cheltenham, Gloucestershire, GL51 6PN		
Company Registration Number: Registered in England & Wales No. OC352911		
Registered Address: Harwood House, Park Road, Melton Mowbray, Leicestershire LE13 1TX		

### Client Details

Company: Lighting Illumination Technology Experience Limited	Email: davehorsfield@lite-ltd.co.uk
Address: Unit 2 Farrington Place, Burnley, BB11 5TY	

### Test Method(s) Used

POTS Standard Operating Procedure:	INTEGRATING SPHERE PROCEDURE POTS016
POTS Standard Operating Procedure:	NFMS OPERATION GUIDE
Standard:	LM79 08

### Details of Product Tested

Manufacturer: Lighting Illumination Technology Experience	Source Type: LED
Model: RGB NO OPTIC	Luminaire Type: SPOTLIGHT
Power Supply Used: Kikusui PCR1000M Voltage Stabiliser S/N SM01191	

### Integrating Sphere Test

Date of Test: 12/01/2018	Ambient Temperature: 25°C
Measurement Filename: RGB NO OPTIC	
Instrument Used: Labsphere model CSLMS HALOGEN 4060 integrating sphere spectroradiometer	
Integrating Sphere Size: 1m	Measurement Geometry ( $2\pi / 4\pi$ ): $2\pi$
Sample Orientation: Facing Downwards	Auxiliary Correction Applied: YES
Comments:	
Date of Last Calibration (Operating Hours): 09-01-2018 (05:32)	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): 127	
CIE 1931 Chromaticity Cx: 0.2664	CIE 1931 Chromaticity Cy: 0.2514
CRI (%): 67.09	CCT (K): 18381

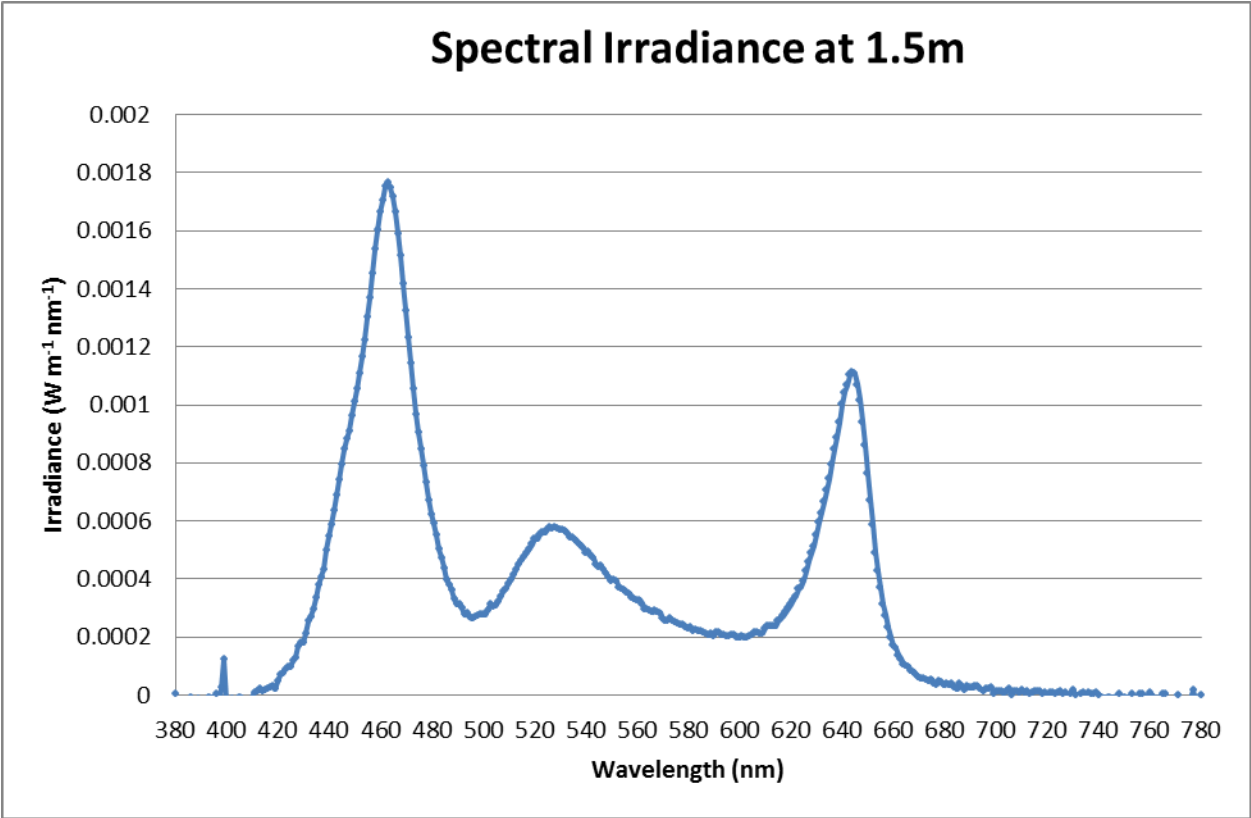


Figure 1: Spectral Irradiance

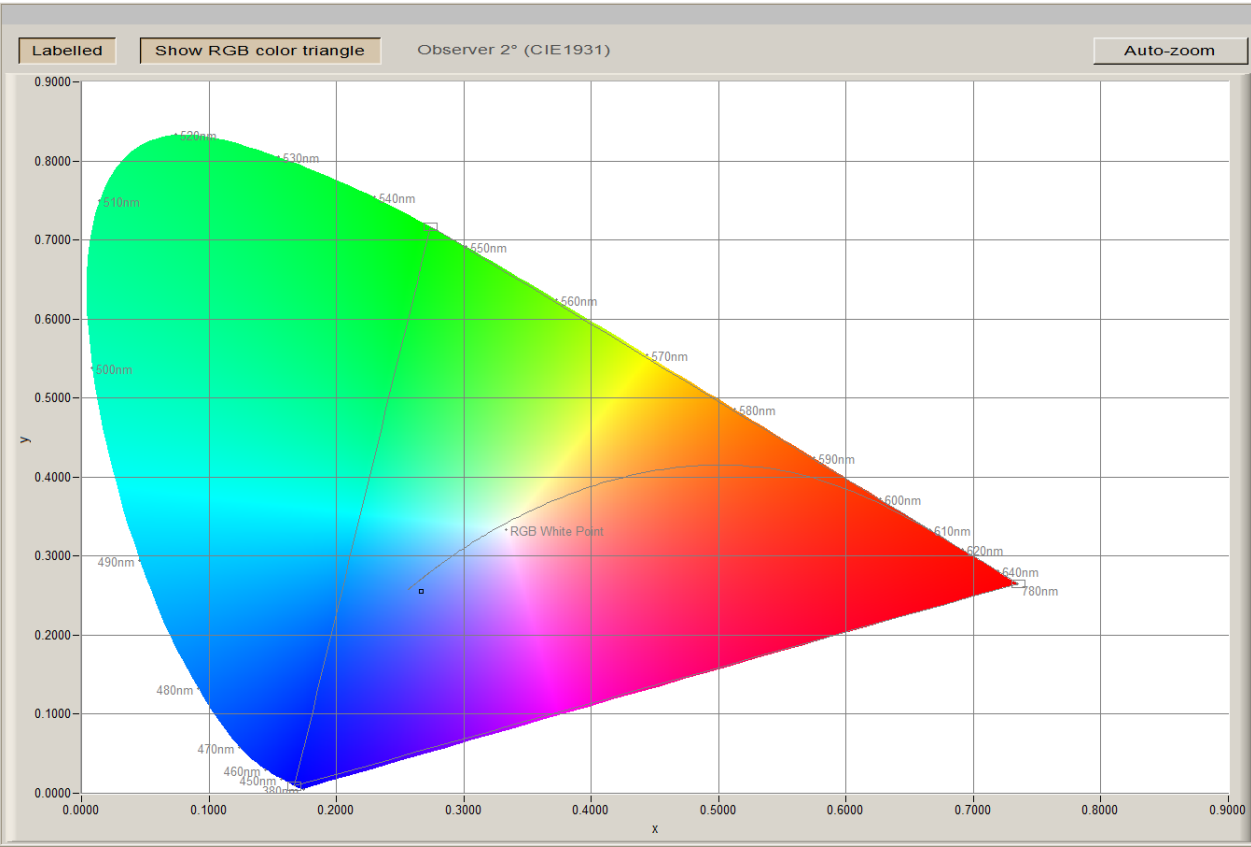


Figure 2: CIE 1931 diagram.

Goniophotometer Test		
Date of Test: 05/01/2018		Ambient Temperature: 25°C
Measurement Filename: RGB NO OPTIC		
Instrument Used: Radiant Imaging NFMS0800 Goniometer with ProMetric PM-1200N-1 Imaging Photometer		
Photometer Working Distance: 1.5m		Measurement Geometry: Near-Field
Comments: Power supply from ballast into LEDs given as 4.7W, and this figure used to calculate lamp efficacy.		
Reference Photometer Used: Specbos1211		Reference Photometer Serial Number: 2014754
Traceable: to NIST standards		
Calibration Certificate Date: 02 November 2017		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):127	Peak Intensity (3° Spot, candelas): 70.6	Efficacy (lumens/Watt): 27.0
Beam Angle (50% of max intensity C0-180, degrees): 76.1		
Photometric Filename (IES LM-63-2002): RGB NO OPTIC		
IES File – Absolute or Relative Format? Absolute		
Photometric Filename (EULUMDAT): RGB NO OPTIC		
EULUMDAT File – Absolute or Relative Format? Absolute		

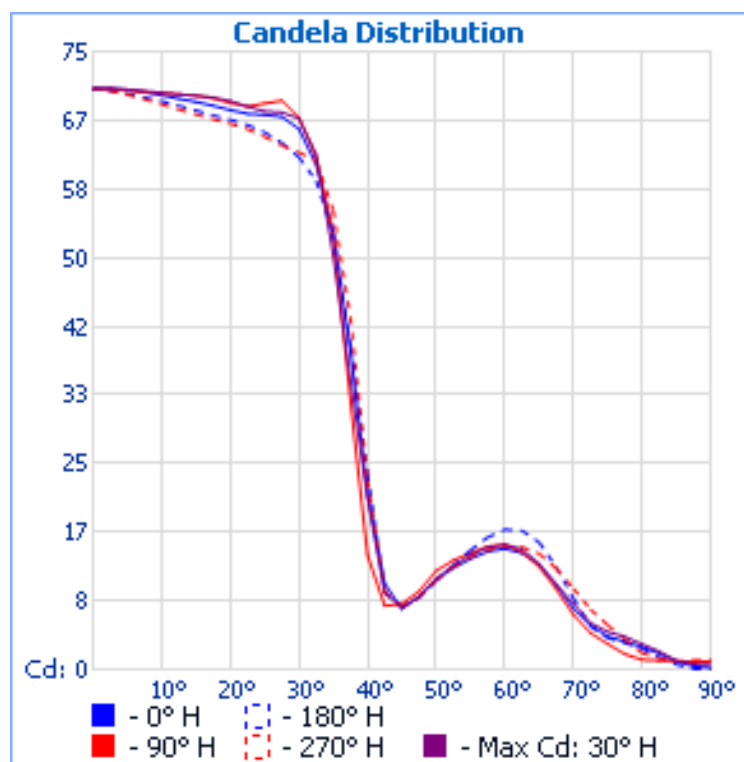


Figure 3: Far-Field Luminous Intensity (C0-180, Cartesian Coordinates)

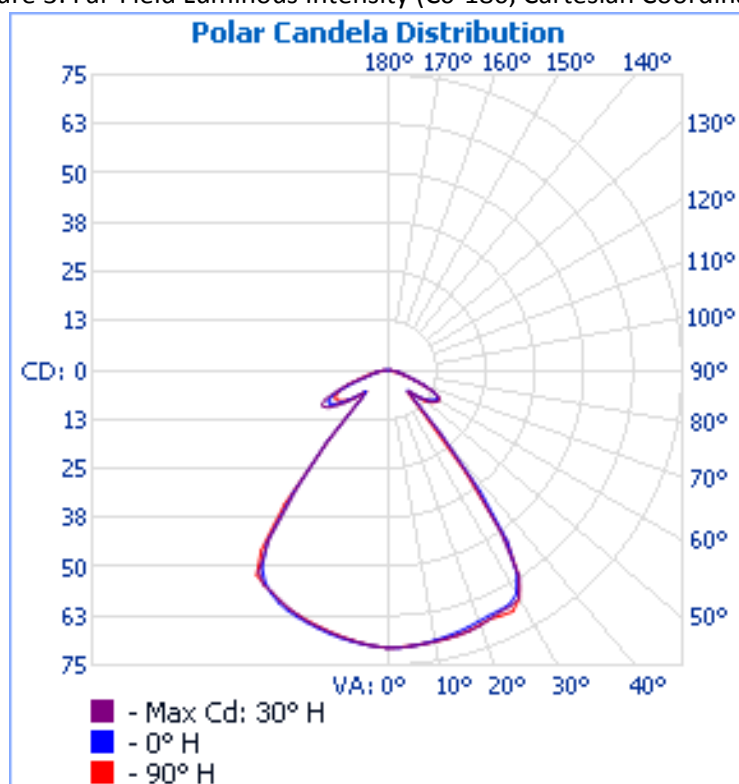


Figure 4: Far-Field Luminous Intensity (C0-180, C90-270, Polar Coordinates)

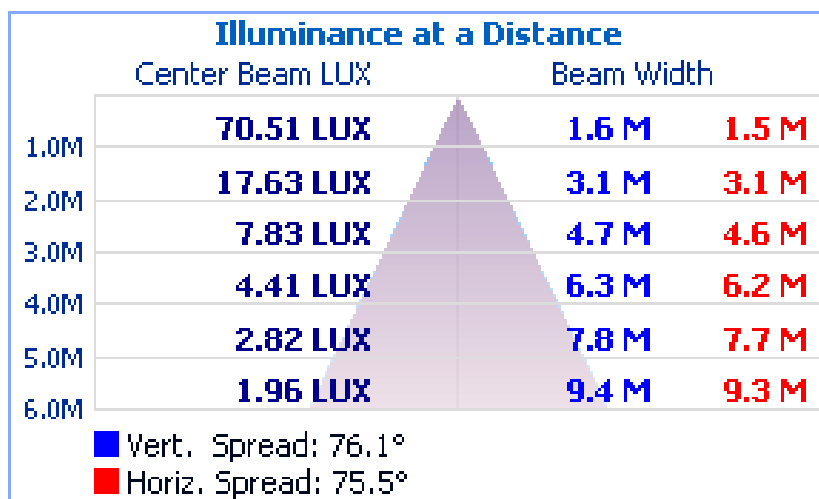


Figure 5. Cone diagram for mounting height of 6 metres.

Reflectance of		0.7	0.7	0.5	0.5	0.3	0.7	0.7	0.5	0.5	0.3
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	20.6	22.0	21.0	22.3	22.7	21.4	22.8	21.8	23.1	23.5
	3H	22.2	23.5	22.6	23.8	24.1	23.4	24.7	23.8	25.0	25.4
	4H	22.5	23.7	22.9	24.0	24.4	23.8	25.0	24.2	25.3	25.7
	6H	22.7	23.8	23.1	24.2	24.6	23.9	25.0	24.3	25.4	25.8
	8H	22.8	23.9	23.2	24.2	24.6	23.9	25.0	24.3	25.4	25.8
	12H	22.8	23.8	23.2	24.2	24.6	23.9	24.9	24.3	25.3	25.7
4H	2H	21.7	22.9	22.1	23.2	23.6	22.7	23.9	23.1	24.2	24.6
	3H	23.2	24.2	23.6	24.6	25.0	24.6	25.6	25.0	26.0	26.4
	4H	23.6	24.5	24.0	24.9	25.3	25.0	25.9	25.5	26.3	26.8
	6H	23.9	24.7	24.4	25.1	25.6	25.1	25.9	25.6	26.4	26.8
	8H	24.0	24.8	24.5	25.2	25.7	25.2	25.9	25.6	26.3	26.8
	12H	24.1	24.8	24.6	25.2	25.7	25.2	25.9	25.7	26.3	26.8
8H	4H	23.8	24.5	24.2	24.9	25.4	25.1	25.8	25.6	26.3	26.7
	6H	24.2	24.8	24.7	25.3	25.8	25.2	25.9	25.7	26.3	26.8
	8H	24.4	25.0	25.0	25.5	26.0	25.3	25.9	25.8	26.4	26.9
	12H	24.6	25.0	25.1	25.5	26.0	25.4	25.8	25.9	26.3	26.8
12H	4H	23.8	24.4	24.2	24.9	25.4	25.1	25.8	25.6	26.2	26.7
	6H	24.2	24.8	24.8	25.3	25.8	25.3	25.8	25.8	26.3	26.8
	8H	24.5	24.9	25.0	25.4	25.9	25.3	25.8	25.9	26.3	26.8

Distance between luminaires: 0.25

Due to missing symmetry characteristics the values apply only to the indicated line of sight.

Table 1. UGR values

	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
2.5	71	71	71	71	71	71	71	71	71	70	70	70	70	70	70	70	70	70	70
5	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
7.5	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	69
10	70	70	70	70	70	70	70	70	70	70	70	70	70	70	69	69	69	69	69
12.5	69	70	70	70	70	70	70	70	70	70	70	70	70	69	69	69	69	69	68
15	69	69	70	70	70	70	70	70	70	70	70	70	69	69	69	69	68	68	68
17.5	68	69	69	69	70	70	70	69	69	69	69	69	69	69	69	68	68	68	67
20	68	68	69	69	69	69	69	69	69	69	69	69	69	69	68	68	67	67	67
22.5	67	68	68	68	69	69	69	68	68	68	68	68	68	68	68	67	67	66	66
25	67	68	68	68	68	68	68	68	69	69	68	68	67	67	67	66	66	66	65
27.5	67	68	68	68	68	68	68	69	69	69	69	69	67	67	67	66	65	65	64
30	66	67	68	67	67	67	67	69	68	67	68	69	68	67	66	65	64	63	62
32.5	61	61	63	63	62	62	62	62	62	62	63	63	66	64	64	62	60	59	59
35	53	52	50	50	50	50	50	50	51	53	55	57	57	58	56	53	51	53	53
37.5	39	37	36	35	34	34	35	31	32	33	34	36	39	38	37	37	39	40	39
40	21	21	22	21	22	21	19	18	15	14	15	16	16	18	18	21	23	23	24
42.5	10	10	9	9	10	10	10	9	8	8	8	9	9	9	8	8	9	9	9
45	7	7	8	8	8	8	8	8	8	8	8	8	8	8	7	7	7	7	8
47.5	9	9	8	9	9	10	9	9	9	10	10	10	10	10	9	8	8	8	9
50	11	11	10	11	11	11	12	11	12	12	12	12	12	12	11	10	10	11	11
52.5	12	12	12	13	13	13	13	13	13	13	13	13	13	13	13	12	12	12	13
55	13	14	14	14	14	15	14	14	14	14	15	15	15	15	15	14	14	14	14
57.5	14	15	15	15	15	15	15	15	15	15	15	16	16	16	16	15	15	15	16
60	15	15	15	15	15	15	15	15	15	15	15	16	16	16	16	16	15	16	17
62.5	14	14	15	15	14	14	14	14	14	14	15	15	15	15	15	15	15	16	17
65	13	13	13	13	13	12	12	12	12	12	13	13	13	13	13	12	13	14	15
67.5	10	11	10	10	10	10	10	10	10	10	10	10	10	11	10	9	10	12	12
70	7	8	8	8	8	7	7	7	7	7	7	7	7	8	8	7	7	8	9
72.5	5	5	6	6	6	5	5	5	5	4	5	5	5	6	6	4	5	5	5
75	4	4	5	5	5	4	4	4	3	3	4	4	4	4	5	3	4	4	4

<b>77.5</b>	3	3	4	4	4	3	3	2	2	2	2	2	3	4	4	3	3	3	3
<b>80</b>	3	3	3	3	3	2	2	1	1	1	1	1	2	2	2	2	2	2	3
<b>82.5</b>	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<b>85</b>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1
<b>87.5</b>	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
<b>90</b>	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0

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>	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
<b>2.5</b>	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	71
<b>5</b>	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
<b>7.5</b>	69	69	69	69	69	69	69	69	69	69	69	69	70	70	70	70	70
<b>10</b>	69	69	69	69	68	68	68	69	69	69	69	69	69	69	69	69	70
<b>12.5</b>	68	68	68	68	68	68	68	68	68	68	68	68	68	69	69	69	69
<b>15</b>	68	68	68	67	67	67	67	67	67	68	68	68	68	68	68	68	69
<b>17.5</b>	67	67	67	67	67	66	67	67	67	67	67	67	67	68	68	68	68
<b>20</b>	67	66	66	66	66	66	66	66	66	67	67	67	67	67	67	67	68
<b>22.5</b>	66	66	65	65	65	65	65	65	66	66	66	66	66	67	66	67	67
<b>25</b>	65	65	64	64	64	64	64	65	65	65	65	65	65	66	66	66	67
<b>27.5</b>	64	64	64	63	63	63	64	64	64	64	64	64	64	65	65	66	67
<b>30</b>	62	63	63	63	63	64	63	63	63	63	64	64	64	64	65	66	65
<b>32.5</b>	59	59	61	61	61	62	60	61	62	62	61	63	62	63	64	62	62
<b>35</b>	53	50	52	53	55	55	55	55	56	56	55	55	56	56	56	55	55
<b>37.5</b>	41	38	38	40	41	42	42	43	43	44	42	41	40	41	42	42	40
<b>40</b>	22	24	25	24	25	23	22	22	23	24	22	21	21	22	24	24	21
<b>42.5</b>	10	10	11	11	12	12	10	10	9	9	10	10	10	9	9	9	10
<b>45</b>	7	8	8	9	9	9	9	8	8	7	8	8	8	8	7	8	7
<b>47.5</b>	8	9	9	9	10	11	10	9	9	8	8	9	9	9	9	9	9



<b>50</b>	11	11	11	11	12	13	12	11	11	11	10	11	11	11	11	11	11
<b>52.5</b>	13	13	14	14	15	15	15	14	12	12	12	13	13	13	13	13	13
<b>55</b>	15	15	16	16	17	18	17	15	14	13	14	15	15	15	14	14	14
<b>57.5</b>	16	17	18	18	19	20	19	16	14	14	15	16	17	16	16	15	15
<b>60</b>	17	18	19	19	21	21	21	17	15	14	15	18	18	17	16	15	15
<b>62.5</b>	17	18	19	20	21	21	21	17	15	14	15	18	18	17	16	15	14
<b>65</b>	16	17	17	18	20	20	20	16	14	13	14	17	17	16	14	13	13
<b>67.5</b>	13	13	14	15	16	17	17	14	12	12	12	15	15	13	12	10	10
<b>70</b>	9	9	11	11	11	13	13	11	10	10	10	11	11	10	9	7	8
<b>72.5</b>	5	6	6	6	6	8	8	8	7	7	7	7	7	7	6	6	5
<b>75</b>	4	4	4	4	5	6	6	5	5	5	5	5	5	5	4	4	4
<b>77.5</b>	3	3	3	3	3	3	4	4	4	4	3	4	4	4	4	4	3
<b>80</b>	3	3	3	2	2	1	2	2	2	2	2	2	3	3	3	3	3
<b>82.5</b>	2	2	1	1	1	0	1	1	1	1	1	1	2	2	2	2	2
<b>85</b>	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
<b>87.5</b>	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0
<b>90</b>	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0

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

Zone	Lumens	% Total
0-5	1.7	1.30%
05-10	5	3.90%
10-15	8.2	6.40%
15-20	11.2	8.80%
20-25	14	11.00%
25-30	16.6	13.00%
30-35	17.8	13.90%
35-40	12.5	9.80%
40-45	4.4	3.40%
45-50	3.8	2.90%
50-55	5.7	4.40%
55-60	7.3	5.70%
60-65	7.7	6.00%
65-70	5.9	4.60%
70-75	3.2	2.50%
75-80	1.8	1.40%
80-85	0.8	0.60%
85-90	0.3	0.30%

Table 3. Zonal Flux Table

Effective Floor Cavity Reflectance: 20%																		
RCC %:	80				70				50			30			10			0
RW %:	70	50	30	0	70	50	30	0	50	30	20	50	30	20	50	30	20	0
RCR: 0	1.19	1.19	1.19	1.19	1.16	1.16	1.16	1	1.11	1.11	1.11	1.06	1.06	1.06	1.02	1.02	1.02	1
1	1.11	1.07	1.03	1	1.08	1.04	1.01	0.88	1	0.97	0.95	0.96	0.94	0.92	0.93	0.91	0.89	0.87
2	1.02	0.95	0.89	0.84	1	0.93	0.88	0.77	0.9	0.85	0.82	0.87	0.83	0.8	0.84	0.81	0.78	0.76
3	0.95	0.86	0.79	0.73	0.92	0.84	0.78	0.68	0.81	0.76	0.71	0.79	0.74	0.7	0.76	0.72	0.69	0.67
4	0.88	0.77	0.7	0.64	0.86	0.76	0.69	0.61	0.74	0.68	0.63	0.72	0.66	0.62	0.7	0.65	0.61	0.59
5	0.82	0.71	0.63	0.57	0.8	0.7	0.62	0.55	0.68	0.61	0.56	0.66	0.6	0.56	0.64	0.59	0.55	0.53
6	0.77	0.65	0.57	0.51	0.75	0.64	0.56	0.5	0.62	0.56	0.51	0.61	0.55	0.5	0.59	0.54	0.5	0.48
7	0.72	0.6	0.52	0.47	0.7	0.59	0.52	0.45	0.58	0.51	0.46	0.56	0.5	0.46	0.55	0.5	0.45	0.44
8	0.67	0.55	0.48	0.42	0.66	0.55	0.47	0.42	0.53	0.47	0.42	0.52	0.46	0.42	0.51	0.46	0.42	0.4
9	0.63	0.51	0.44	0.39	0.62	0.51	0.44	0.38	0.5	0.43	0.39	0.49	0.43	0.39	0.48	0.42	0.38	0.37
10	0.6	0.48	0.41	0.36	0.59	0.47	0.41	0.36	0.47	0.4	0.36	0.46	0.4	0.36	0.45	0.39	0.36	0.34

Table 4. Utilisation Factor Table

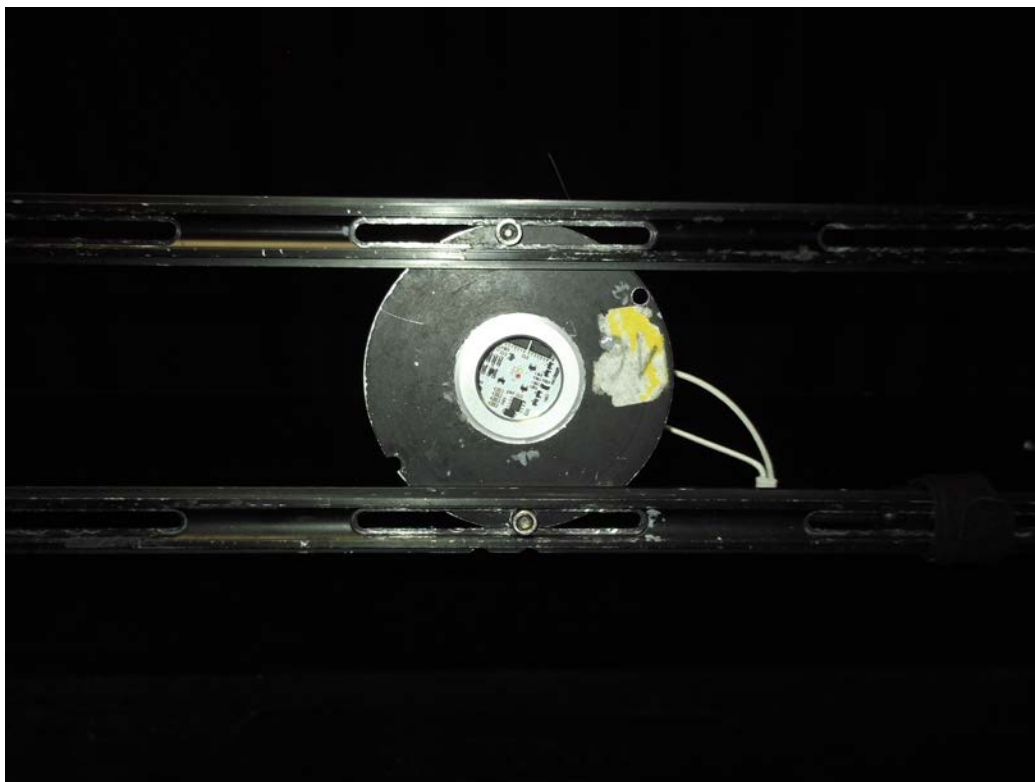


Photo 1: Luminaire on goniometer mount

Signature:

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Print Name:

D CHAMBERS

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Date:

16/01/2018

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Technical Manager

*Duly authorised to sign on behalf of:*

Photometric and Optical Testing Services LLP