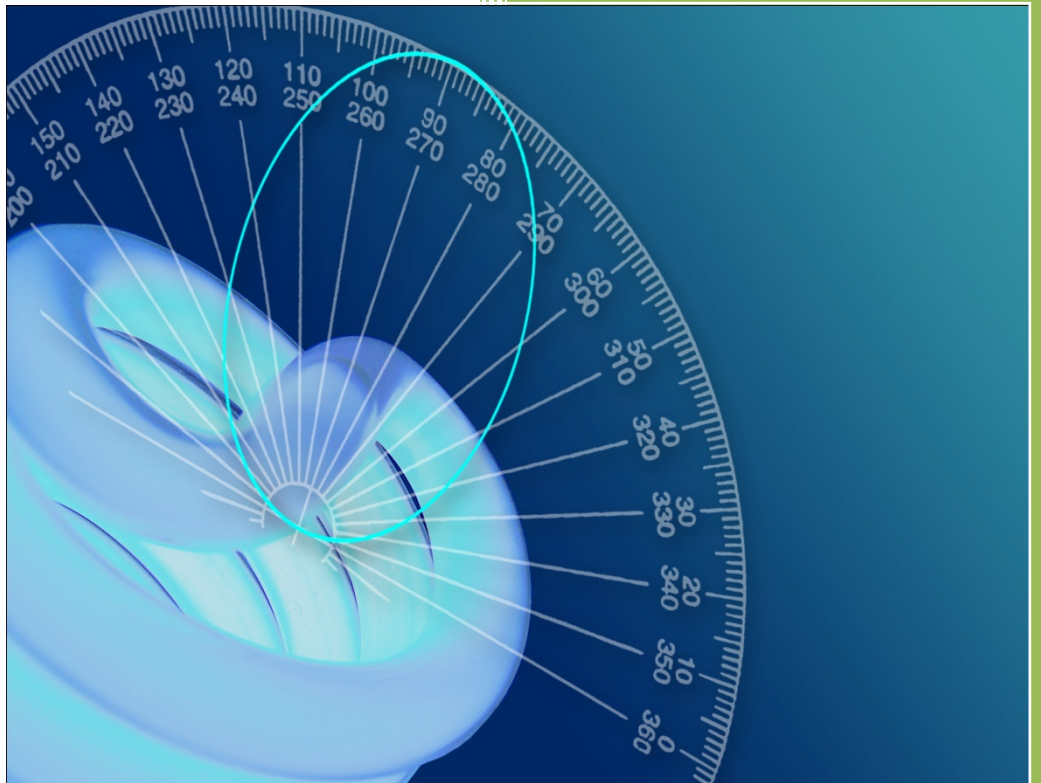


# Photometric Test Report



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/DC18013	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: WHITE 15/30 DEG 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: WHITE 15_30 DEG 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): 242	
CIE 1931 Chromaticity Cx: 0.3806	CIE 1931 Chromaticity Cy: 0.3759
CRI (%): 77.39	CCT (K): 3985

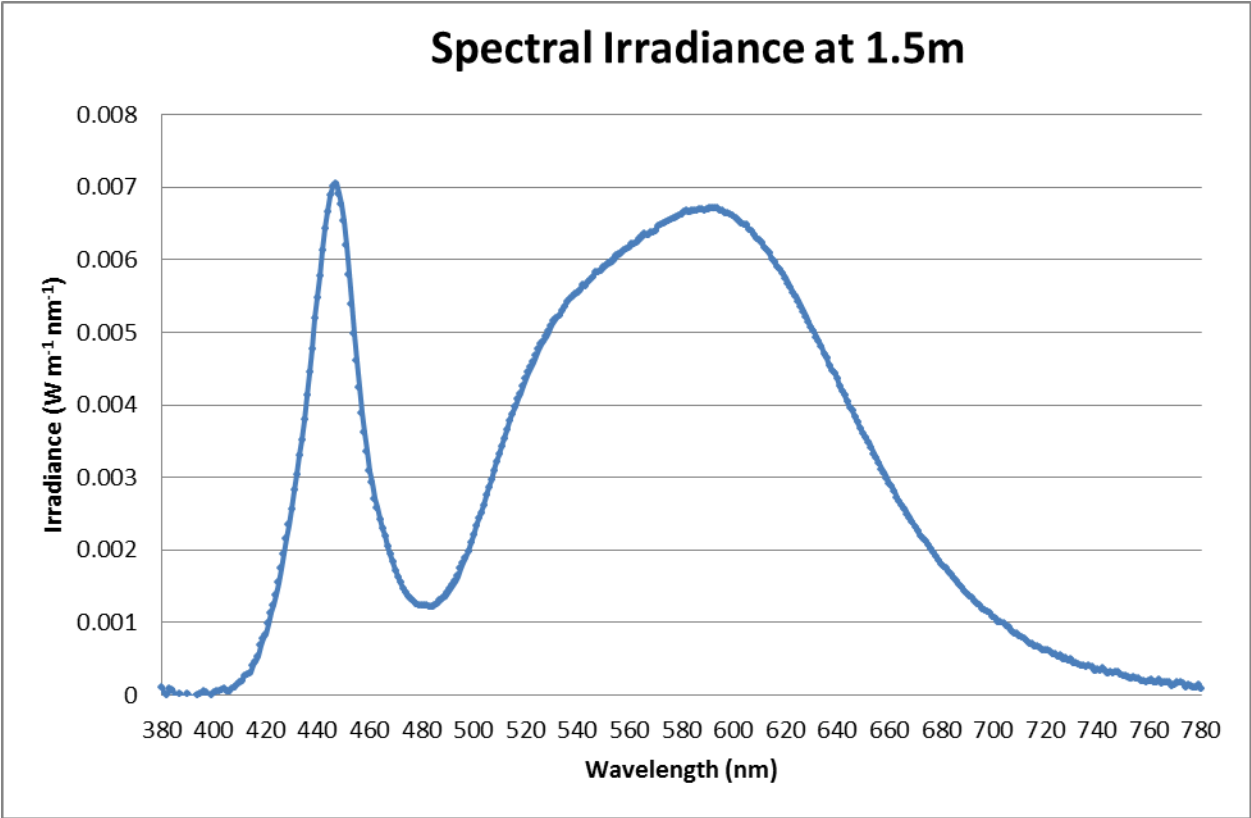


Figure 1: Spectral Irradiance

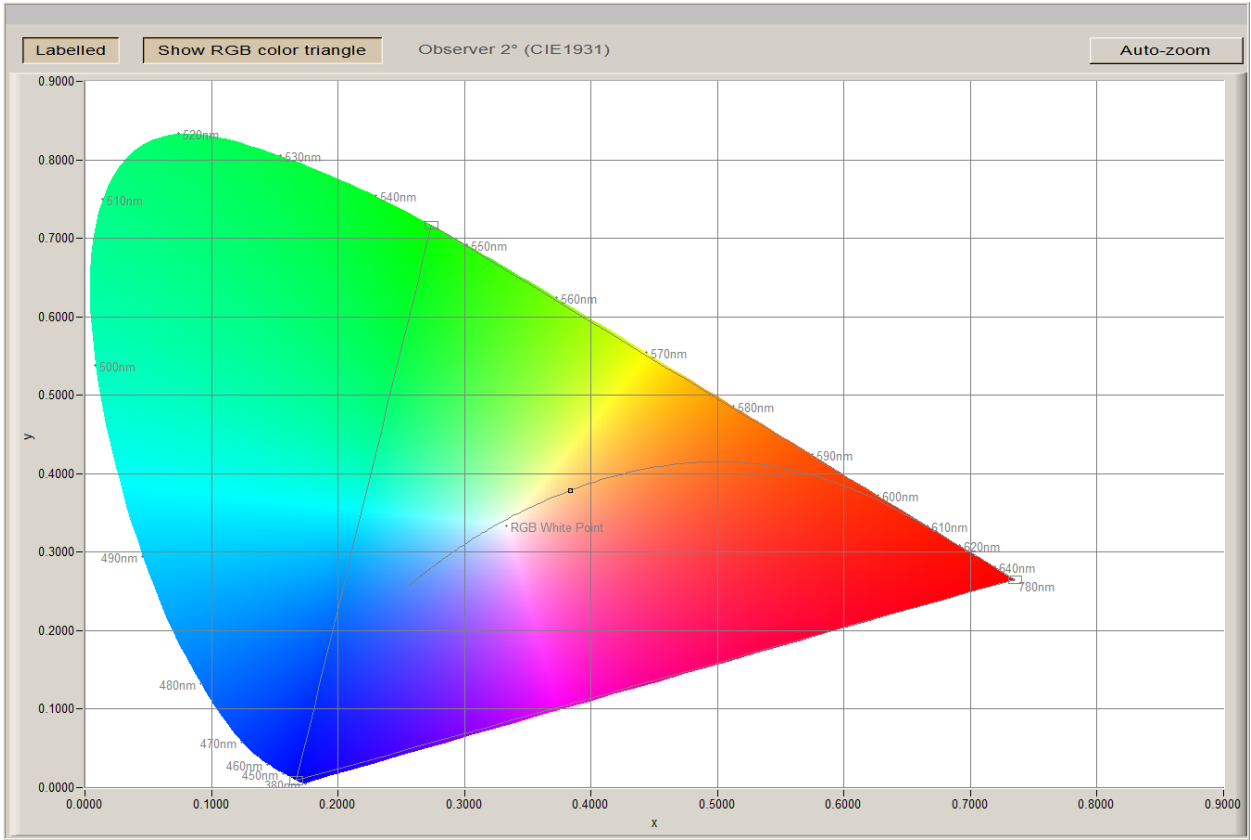


Figure 2: CIE 1931 diagram.

Goniophotometer Test		
Date of Test: 04/05/2018		Ambient Temperature: 25°C
Measurement Filename: WHITE 15_30 DEG 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	0-20°	1°
Inclination Zone 2	22.5-45°	2.5°
Inclination Zone 3	50-90°	5°
Azimuth	0-360°	10°
Results		
Integrated Luminous Flux (lumens):238	Peak Intensity (3° Spot, candelas): 1198	Efficacy (lumens/Watt): 50.6
Beam Angle (50% of max intensity C0-180, degrees): 20.4		
Photometric Filename (IES LM-63-2002): WHITE 15_30 DEG OPTIC		
IES File – Absolute or Relative Format? Absolute		
Photometric Filename (EULUMDAT): WHITE 15_30 DEG OPTIC		
EULUMDAT File – Absolute or Relative Format? Absolute		

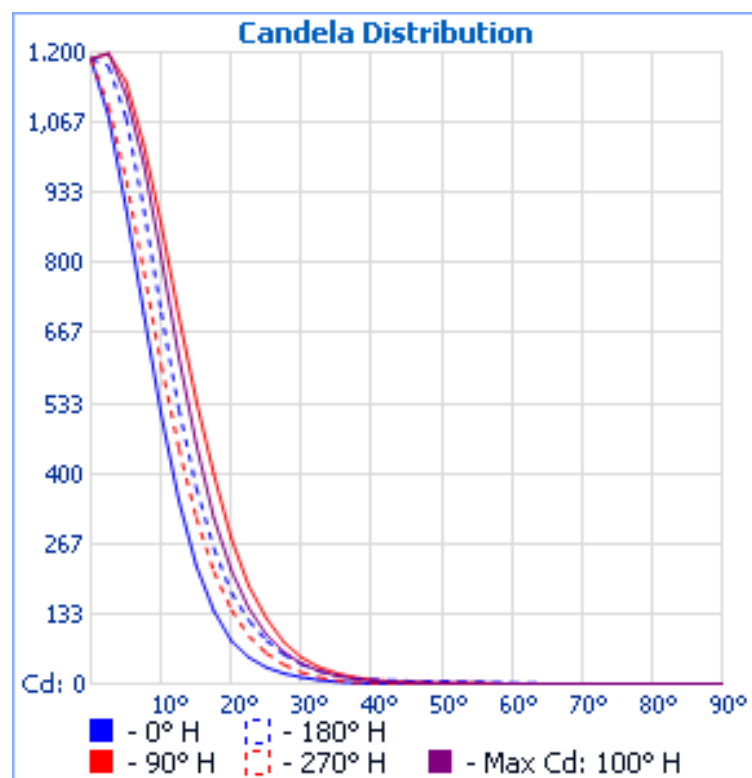


Figure 3: Far-Field Luminous Intensity (C0-180, Cartesian Coordinates)

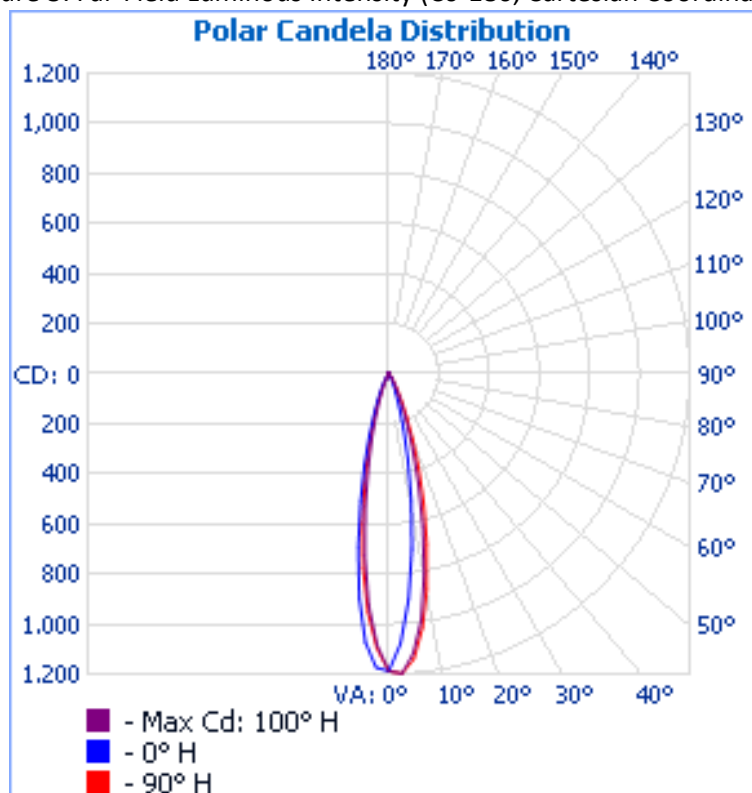


Figure 4: Far-Field Luminous Intensity (C0-180, C90-270, Polar Coordinates)

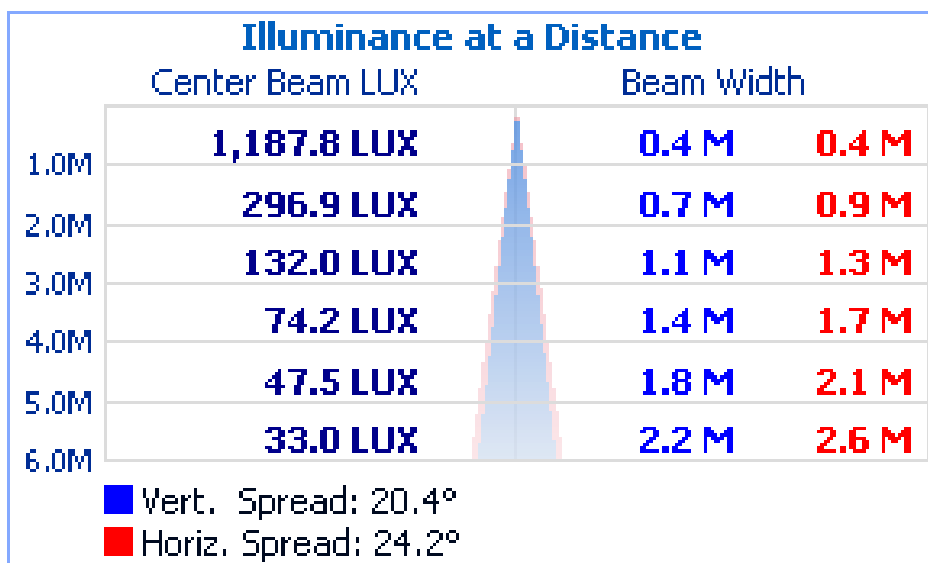


Figure 5. Cone diagram for mounting height of 6 metres.

reflectance of											
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

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	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188
2.5	1077	1095	1109	1122	1137	1155	1172	1187	1198	1198	1198	1195	1189	1185	1182	1181	1181	1179	1174
5	903	939	982	1032	1060	1093	1134	1134	1138	1144	1119	1103	1097	1076	1068	1064	1061	1067	1076
7.5	705	761	827	892	961	1011	1038	1056	1049	1025	990	944	915	881	866	861	866	882	904
10	513	575	657	751	828	889	926	935	915	873	812	753	702	666	650	637	649	670	706
12.5	349	423	504	598	684	764	799	798	764	700	622	558	508	462	442	443	448	475	523
15	225	285	364	466	548	622	658	652	612	539	457	390	345	307	285	288	301	322	374
17.5	139	187	257	340	409	482	514	504	462	398	315	260	226	199	185	187	200	220	258
20	82	120	176	239	308	364	390	376	342	276	216	169	146	130	121	125	133	148	174
22.5	51	76	117	161	212	257	278	265	234	186	144	109	95	85	80	84	90	103	120
25	32	46	74	105	141	175	191	183	160	125	94	73	63	58	55	56	62	70	83
27.5	20	28	46	71	100	123	129	121	104	79	61	48	42	41	40	39	42	47	56
30	13	18	28	47	68	84	87	80	68	51	39	31	30	30	31	29	29	32	38
32.5	8	11	17	29	43	54	58	54	43	32	25	21	21	23	23	22	20	21	25
35	4	6	10	18	27	34	36	35	29	21	16	14	15	17	17	15	13	14	16
37.5	2	3	6	11	16	21	23	22	18	13	10	9	10	11	10	9	8	9	11
40	1	1	3	6	10	12	14	13	11	8	6	6	7	6	6	5	5	7	9
42.5	0	1	1	3	5	7	8	8	8	6	4	4	5	4	5	4	4	6	7
45	0	0	0	1	3	4	5	5	5	4	3	3	4	4	5	4	4	5	6
47.5	0	0	0	1	1	2	3	3	3	3	3	2	3	4	6	5	4	5	6
50	0	0	0	0	1	1	1	2	2	2	2	3	3	5	6	5	5	5	5
52.5	0	0	0	0	0	1	1	1	1	2	2	2	3	4	5	5	4	5	5
55	0	0	0	0	0	0	0	1	1	1	2	2	3	4	5	4	4	5	4
57.5	0	0	0	0	0	0	0	0	1	1	1	2	3	3	4	3	3	4	3
60	0	0	0	0	0	0	0	0	0	1	1	1	2	3	3	3	2	3	3
62.5	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	2	2	2	2
65	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	1	1	1</

<b>77.5</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
<b>80</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>82.5</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>85</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>87.5</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>90</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	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>	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188	1188
<b>2.5</b>	1170	1166	1162	1156	1150	1138	1126	1112	1098	1083	1071	1061	1057	1056	1054	1057	1065
<b>5</b>	1087	1089	1089	1084	1069	1048	1020	988	957	926	897	869	848	839	845	860	879
<b>7.5</b>	932	959	968	970	959	929	886	839	785	731	684	649	619	604	609	632	664
<b>10</b>	745	790	822	832	822	798	738	672	606	540	487	441	410	393	395	417	460
<b>12.5</b>	573	624	668	691	679	647	593	525	448	376	319	277	248	239	243	251	290
<b>15</b>	423	478	524	548	545	515	456	384	316	258	203	167	141	135	136	148	180
<b>17.5</b>	298	349	394	417	416	394	336	274	214	165	124	97	81	75	74	84	107
<b>20</b>	209	247	290	305	303	281	238	189	141	103	74	57	48	44	45	50	63
<b>22.5</b>	144	173	196	212	210	193	163	127	91	62	44	34	29	28	29	32	38
<b>25</b>	96	115	130	140	139	127	109	83	59	39	27	21	19	18	19	21	24
<b>27.5</b>	65	75	85	91	90	83	70	53	37	24	16	13	12	12	12	13	16
<b>30</b>	42	50	56	59	58	53	45	34	22	14	10	8	8	8	8	9	10
<b>32.5</b>	28	32	37	39	38	34	28	21	13	8	6	5	5	5	5	6	6
<b>35</b>	19	22	26	26	26	23	18	12	7	4	3	3	2	2	3	3	4
<b>37.5</b>	14	16	19	19	18	15	11	7	3	2	1	1	1	1	1	1	2
<b>40</b>	10	12	13	14	12	10	7	4	2	1	0	0	0	0	0	0	1
<b>42.5</b>	8	9	10	10	9	7	5	2	1	0	0	0	0	0	0	0	0
<b>45</b>	6	7	7	7	6	5	3	1	1	0	0	0	0	0	0	0	0
<b>47.5</b>	5	5	6	5	5	3	2	1	0	0	0	0	0	0	0	0	0



<b>50</b>	5	4	4	4	3	2	1	0	0	0	0	0	0	0	0	0	0
<b>52.5</b>	4	4	3	3	2	1	1	0	0	0	0	0	0	0	0	0	0
<b>55</b>	3	3	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0
<b>57.5</b>	3	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
<b>60</b>	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>62.5</b>	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>65</b>	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>67.5</b>	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
<b>70</b>	3	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
<b>72.5</b>	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>75</b>	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>77.5</b>	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>80</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>82.5</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>85</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>87.5</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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°

Zone	Lumens	% Total
0-5	26	10.50%
05-10	59.5	24.00%
10-15	60.6	24.50%
15-20	44.5	18.00%
20-25	27.1	10.90%
25-30	14.5	5.90%
30-35	7.3	2.90%
35-40	3.4	1.40%
40-45	1.6	0.70%
45-50	1	0.40%
50-55	0.7	0.30%
55-60	0.5	0.20%
60-65	0.3	0.10%
65-70	0.2	0.10%
70-75	0.2	0.10%
75-80	0.1	0.00%
80-85	0	0.00%
85-90	0	0.00%

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	1.15	1.13	1.11	1.09	1.13	1.11	1.09	0.97	1.07	1.05	1.04	1.03	1.02	1.01	1	0.99	0.98	0.96
2	1.11	1.07	1.04	1.02	1.09	1.06	1.03	0.93	1.03	1	0.98	1	0.98	0.96	0.97	0.96	0.94	0.93
3	1.07	1.03	0.99	0.96	1.06	1.01	0.98	0.9	0.99	0.96	0.94	0.97	0.94	0.92	0.94	0.93	0.91	0.9
4	1.04	0.98	0.94	0.91	1.02	0.97	0.94	0.87	0.95	0.92	0.9	0.94	0.91	0.89	0.92	0.9	0.88	0.87
5	1.01	0.95	0.91	0.87	0.99	0.94	0.9	0.85	0.92	0.89	0.86	0.91	0.88	0.86	0.89	0.87	0.85	0.84
6	0.98	0.91	0.87	0.84	0.97	0.91	0.87	0.82	0.89	0.86	0.83	0.88	0.85	0.83	0.87	0.84	0.82	0.81
7	0.95	0.88	0.84	0.81	0.94	0.88	0.84	0.8	0.87	0.83	0.8	0.86	0.82	0.8	0.85	0.82	0.8	0.79
8	0.92	0.86	0.81	0.78	0.91	0.85	0.81	0.77	0.84	0.81	0.78	0.83	0.8	0.78	0.82	0.8	0.77	0.76
9	0.9	0.83	0.79	0.76	0.89	0.83	0.79	0.75	0.82	0.78	0.76	0.81	0.78	0.75	0.8	0.77	0.75	0.74
10	0.87	0.81	0.76	0.74	0.87	0.8	0.76	0.73	0.8	0.76	0.74	0.79	0.76	0.73	0.78	0.75	0.73	0.72

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