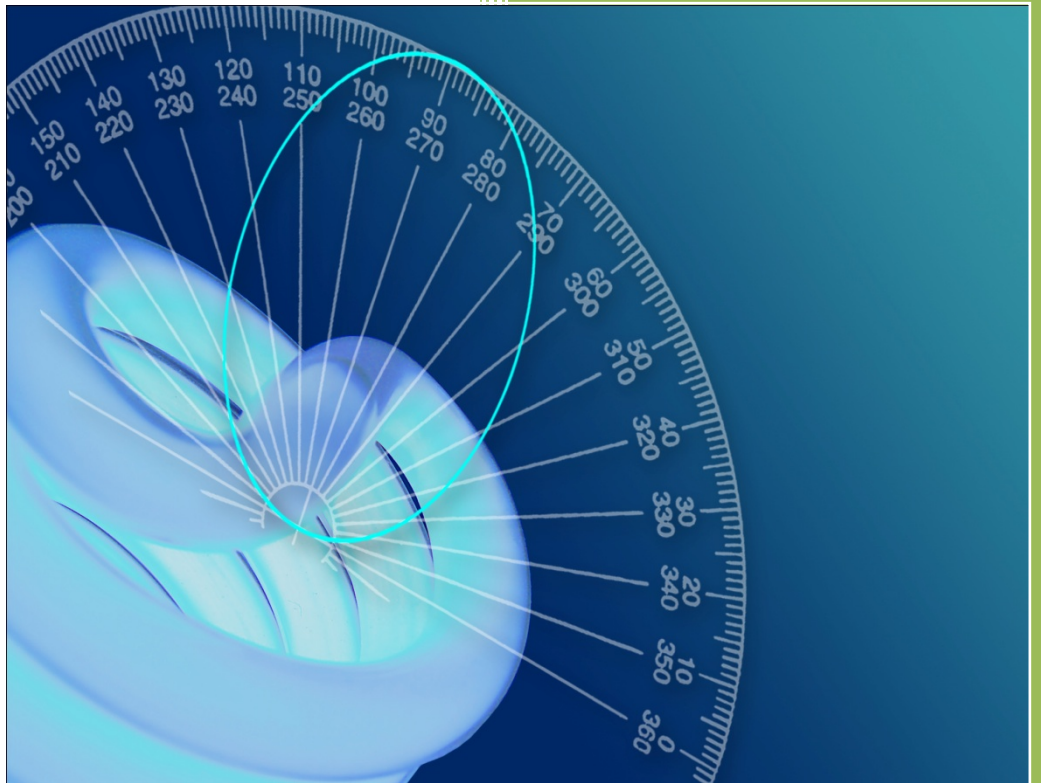


Photometric Test Report



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/DC16202	Report Date: 05/10/2016	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: TLC Southern Ltd	
Address: The TLC Building, 5 Newton Road, Crawley, West Sussex, RH10 9TS	

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: TLC Southern Ltd	Source Type: LED
Model: LTLD8CW	Luminaire Type: SPOTLIGHT
Power Supply Used: Kikusui PCR1000M Voltage Stabiliser S/N SM01191	
Voltage(AC V) = 230.0	Current (mA)= 47
Power (Watts)= 9.684	Power factor= 0.898

Integrating Sphere Test

Date of Test: 27/09/2016	Ambient Temperature: 25°C
Measurement Filename: LTLD8CW	
Instrument Used: Labsphere model CSLMS HALOGEN 4060 integrating sphere spectroradiometer	
Integrating Sphere Size: 1m	Measurement Geometry ($2\pi / 4\pi$): 4π
Sample Orientation: Facing Downwards	Auxiliary Correction Applied: YES
Comments:	
Date of Last Calibration (Operating Hours): 05-09-2016 (05:01)	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 th February 2010
Calibration Lamp Uncertainty: $\pm 0.67\%$ ($k=2$)	
Results	
Flux (lumens): 829.1	
CIE 1931 Chromaticity Cx: 0.3839	CIE 1931 Chromaticity Cy: 0.3846
CRI (%): 83.42	CCT (K): 3964

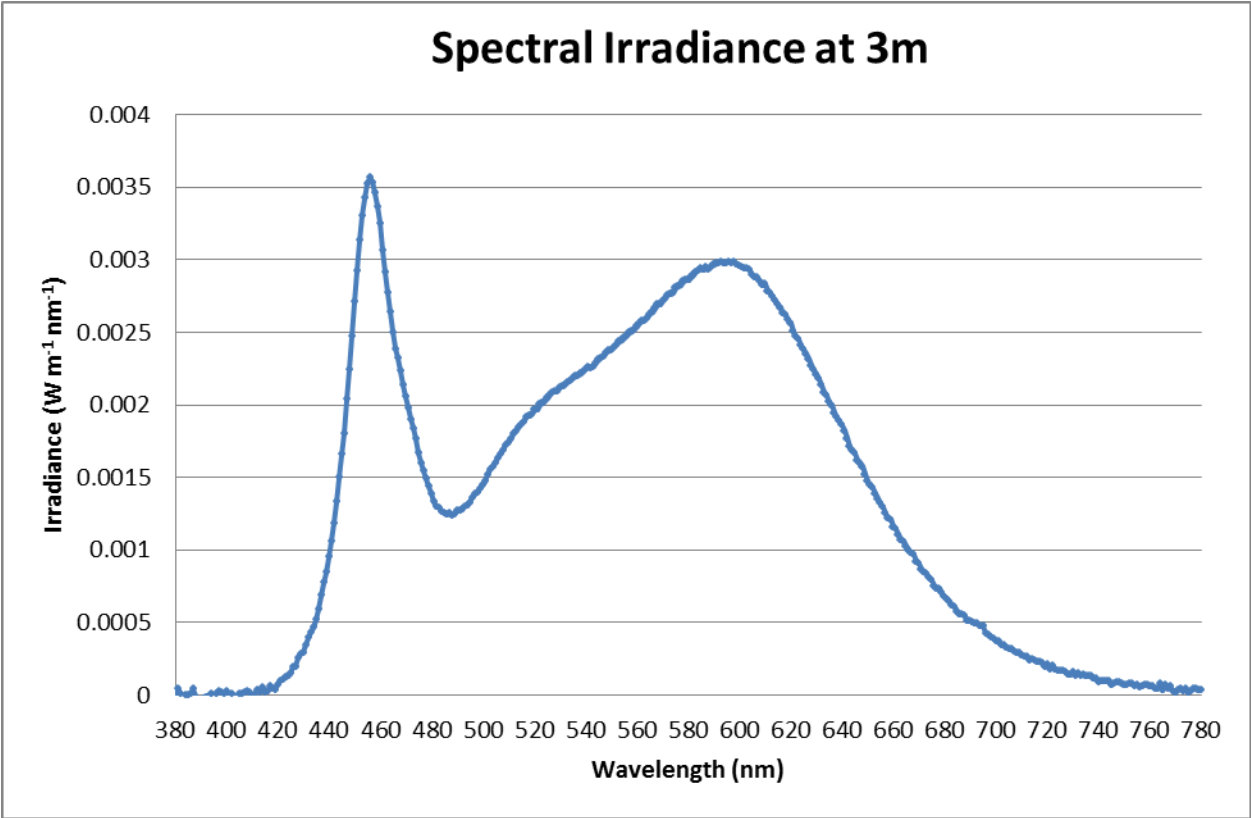


Figure 1: Spectral Irradiance

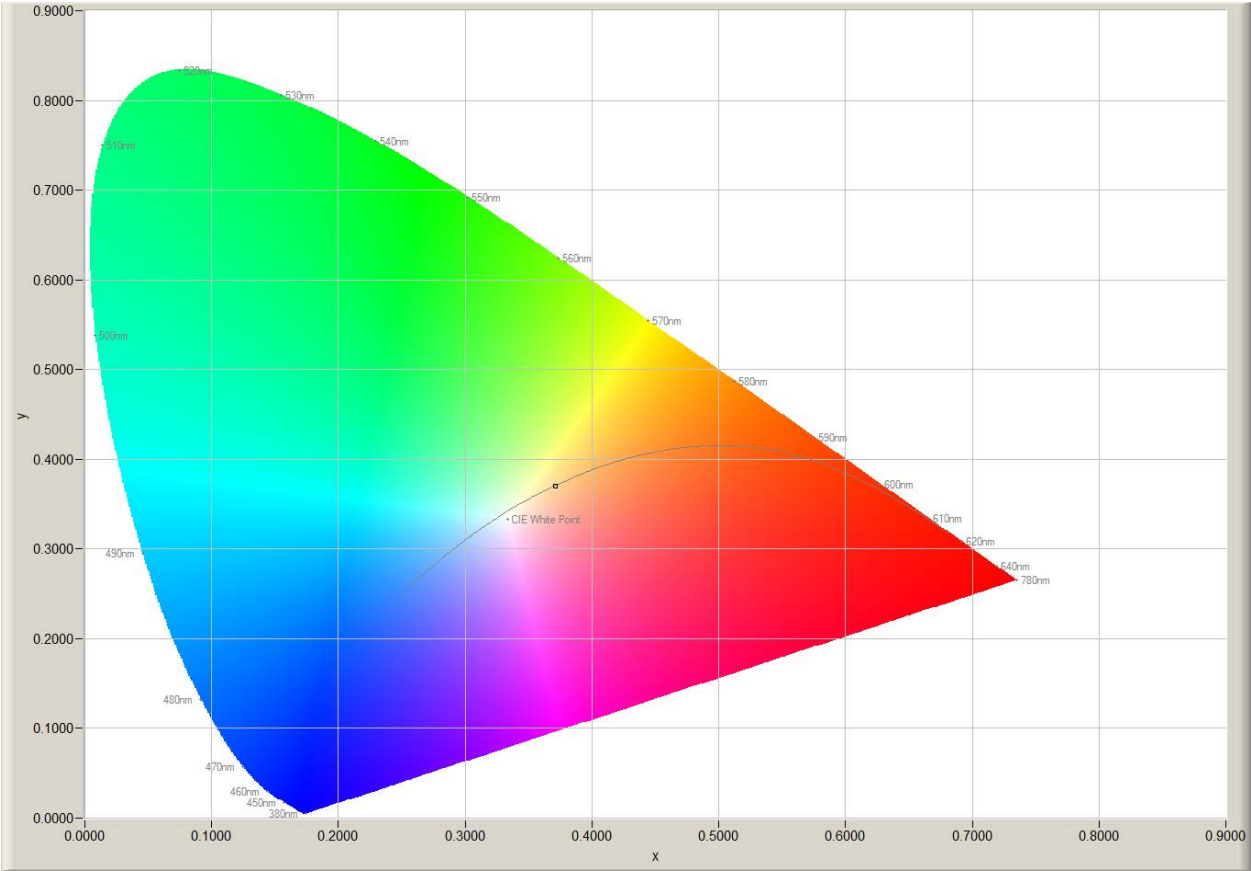


Figure 2: CIE 1931 diagram.

Goniophotometer Test		
Date of Test: 05/10/2016		Ambient Temperature: 25°C
Measurement Filename: LTLD8CW		
Instrument Used: Radiant Imaging NFMS0800 Goniometer with ProMetric PM-1200N-1 Imaging Photometer		
Photometer Working Distance: 3m		Measurement Geometry: Near-Field
Comments:		
Reference Photometer Used: Specbos1201		Reference Photometer Serial Number: 2911670
Traceable: to NIST standards		
Calibration Certificate Date: 11 November 2015		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	0-30°	2°
Inclination Zone 2	34-90°	4°
Azimuth	0-360°	10°
Results		
Integrated Luminous Flux (lumens): 829.1	Peak Intensity (3° Spot, candelas): 1725.9	Efficacy (lumens/Watt): 85.6
Beam Angle (50% of max intensity C0-180, degrees): 40.8		
Photometric Filename (IES LM-63-2002): LTLD8CW		
IES File – Absolute or Relative Format? ABSOLUTE		
Photometric Filename (EULUMDAT): LTLD8CW		
EULUMDAT File – Absolute or Relative Format? ABSOLUTE		

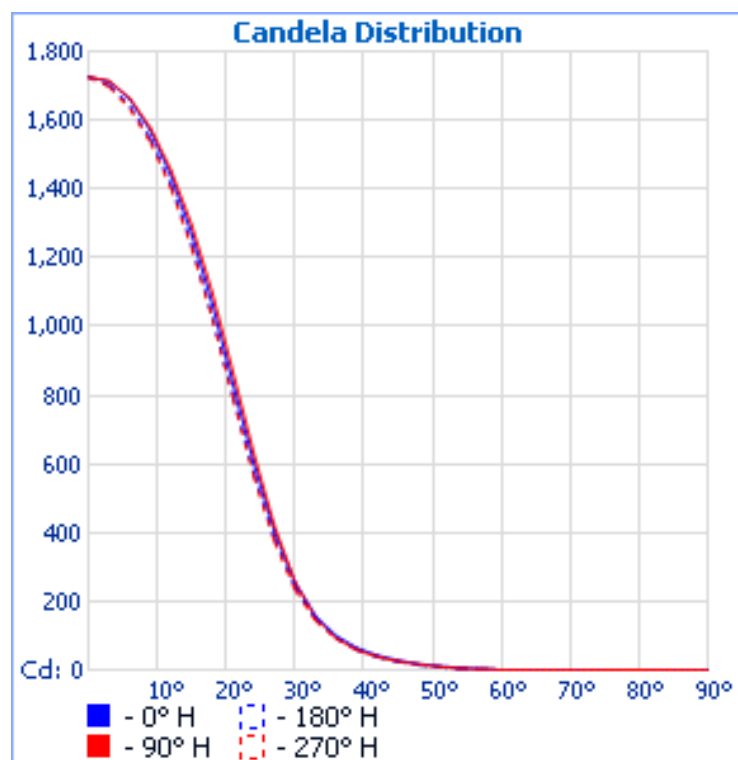


Figure 3: Far-Field Luminous Intensity (C0-180, Cartesian Coordinates)

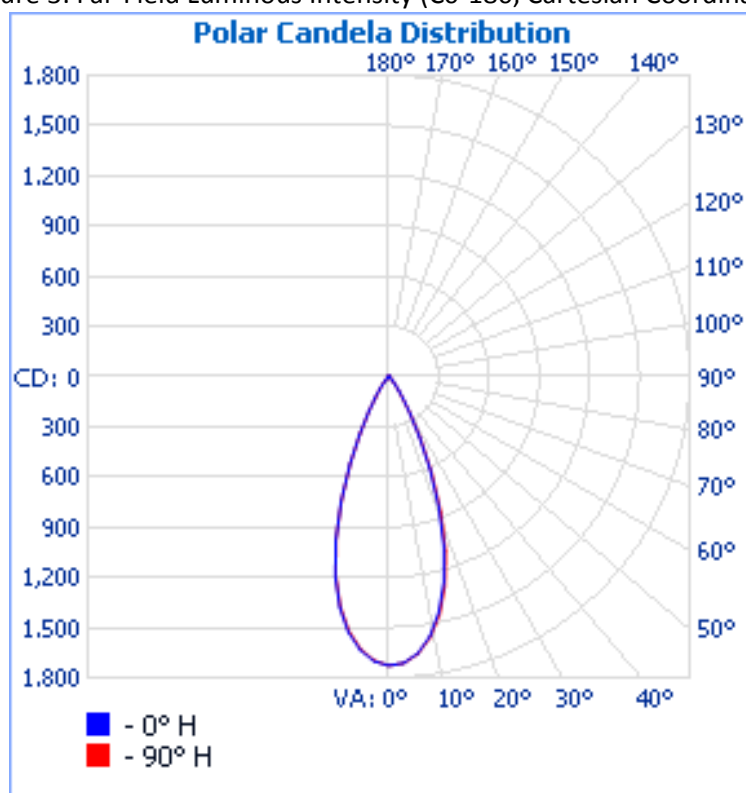


Figure 4: Far-Field Luminous Intensity (C0-180, C90-270, Polar Coordinates)

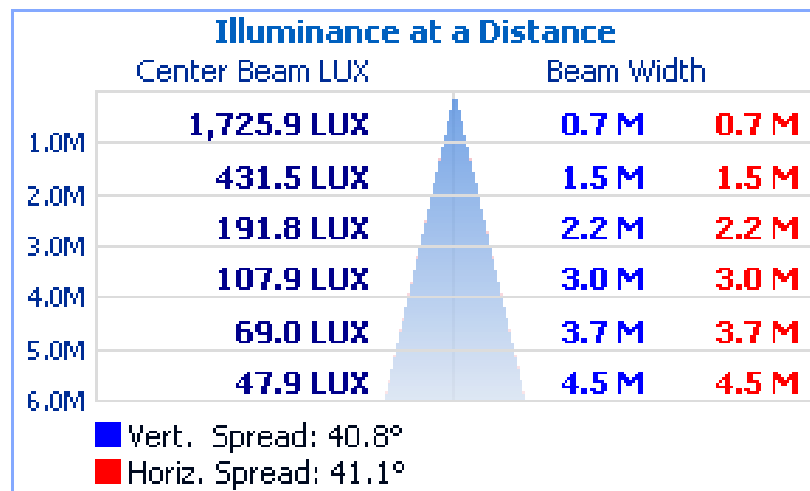


Figure 5. Cone diagram for mounting height of 6 metres.

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	17.3	18.1	17.7	18.4	18.7	16.8	17.5	17.2	17.9	18.2
	3H	17.1	17.8	17.5	18.1	18.5	16.5	17.2	16.9	17.6	17.9
	4H	17.0	17.6	17.4	18.0	18.3	16.4	17.0	16.8	17.4	17.8
	6H	16.9	17.4	17.3	17.8	18.2	16.3	16.9	16.7	17.3	17.7
	8H	16.8	17.3	17.2	17.7	18.1	16.2	16.8	16.6	17.1	17.6
4H	12H	16.7	17.2	17.1	17.6	18.0	16.1	16.7	16.6	17.1	17.5
	2H	17.0	17.6	17.4	18.0	18.3	16.4	17.1	16.8	17.4	17.8
	3H	16.7	17.2	17.1	17.6	18.0	16.1	16.7	16.6	17.1	17.5
	4H	16.6	17.0	17.0	17.5	17.9	16.0	16.5	16.5	16.9	17.4
	6H	16.4	16.8	16.9	17.3	17.7	15.9	16.3	16.3	16.7	17.2
8H	8H	16.4	16.7	16.8	17.2	17.7	15.8	16.2	16.3	16.6	17.1
	12H	16.3	16.6	16.8	17.1	17.6	15.7	16.1	16.2	16.5	17.1
	4H	16.4	16.7	16.8	17.2	17.7	15.8	16.2	16.3	16.6	17.1
	6H	16.2	16.5	16.7	17.0	17.5	15.6	15.9	16.1	16.4	16.9
	8H	16.1	16.4	16.7	16.9	17.4	15.6	15.8	16.1	16.4	16.9
12H	12H	16.0	16.3	16.6	16.8	17.3	15.5	15.7	16.0	16.2	16.7
	4H	16.3	16.6	16.8	17.1	17.6	15.7	16.1	16.2	16.5	17.1
	6H	16.1	16.4	16.7	16.9	17.4	15.6	15.8	16.1	16.4	16.9
	8H	16.0	16.3	16.6	16.8	17.3	15.5	15.7	16.0	16.2	16.7

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	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726
3	1713	1714	1713	1716	1715	1715	1715	1715	1715	1714	1713	1712	1710	1708	1707	1708	1702	1703	1702
6	1661	1661	1668	1669	1667	1665	1667	1666	1665	1664	1662	1661	1660	1656	1656	1655	1652	1643	1642
9	1570	1567	1575	1569	1572	1574	1576	1578	1579	1577	1576	1573	1569	1563	1559	1553	1557	1546	1546
12	1438	1437	1439	1443	1459	1457	1457	1454	1454	1454	1451	1448	1447	1445	1445	1426	1418	1413	1411
15	1269	1265	1280	1282	1287	1297	1294	1298	1292	1294	1288	1291	1284	1284	1271	1262	1255	1236	1236
18	1065	1082	1071	1087	1080	1092	1093	1100	1106	1097	1103	1094	1084	1079	1061	1064	1042	1048	1027
21	833	849	852	868	865	861	872	883	876	867	874	878	864	849	846	843	823	815	796
24	603	614	621	609	626	629	627	640	636	630	634	637	622	620	610	588	596	586	573
27	405	417	410	412	424	424	422	419	422	420	421	417	418	417	412	396	391	396	385
30	255	263	262	265	263	257	261	264	261	256	260	262	258	252	254	252	247	248	242
33	158	161	163	165	163	157	156	153	154	152	153	152	154	153	156	156	152	151	150
36	100	100	100	104	101	98	96	92	92	92	92	92	94	95	95	97	92	93	94
39	64	64	66	63	63	63	60	60	59	58	59	60	59	60	59	57	59	59	60
42	43	42	43	42	43	41	40	39	38	39	39	39	40	39	39	37	38	38	39
45	28	28	28	28	28	27	27	26	25	26	25	26	26	25	25	24	23	24	25
48	18	18	19	19	18	17	17	17	16	16	16	16	16	15	15	15	14	15	15
51	12	12	11	12	11	11	11	10	10	10	10	10	9	9	8	8	7	8	9
54	7	7	8	7	7	7	6	6	6	5	5	5	5	5	4	4	4	4	5
57	3	4	5	5	4	4	3	3	3	3	3	3	3	2	2	2	2	2	3
60	2	2	3	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	2
63	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
66	1	1	1	1	1	1	0	0	1	1	1	1	1	0	1	0	0	1	0
69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90	0	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°

	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350
0	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726	1726
3	1700	1697	1699	1696	1695	1696	1696	1697	1698	1699	1700	1702	1703	1705	1709	1708	1711
6	1636	1639	1637	1633	1629	1631	1631	1632	1634	1636	1639	1643	1644	1650	1656	1659	1657
9	1536	1537	1525	1524	1524	1527	1530	1534	1536	1539	1541	1543	1545	1547	1550	1563	1561
12	1399	1391	1388	1399	1394	1393	1393	1397	1402	1404	1407	1414	1420	1427	1419	1422	1429
15	1217	1220	1213	1212	1219	1216	1223	1221	1229	1229	1239	1240	1249	1246	1251	1259	1255
18	1027	1001	1008	994	1003	1004	1015	1026	1022	1034	1032	1029	1035	1030	1049	1044	1069
21	794	783	787	778	771	781	797	795	791	803	813	805	800	811	825	823	834
24	569	563	542	551	551	550	566	566	565	573	579	568	574	576	569	593	600
27	384	369	364	369	368	367	367	374	376	379	376	378	382	384	380	386	404
30	243	236	234	231	226	230	234	236	234	238	239	235	231	237	242	245	253
33	150	149	149	148	143	143	142	145	144	145	144	144	144	149	152	153	155
36	93	93	96	95	93	92	90	91	92	91	90	92	92	94	97	95	97
39	59	61	60	61	61	59	60	59	60	60	60	59	61	60	60	63	62
42	38	40	40	42	40	40	39	39	40	40	40	40	41	41	40	41	41
45	24	25	26	27	27	26	26	25	26	27	27	27	27	27	27	27	27
48	15	16	17	17	17	16	16	16	17	17	18	18	18	18	18	18	18
51	9	9	10	10	10	9	9	10	10	11	11	11	11	11	11	10	11
54	5	6	5	6	5	5	5	5	5	5	6	5	6	6	6	6	6
57	3	3	3	3	3	3	2	2	2	3	2	3	3	3	3	3	3
60	2	2	2	2	1	1	1	1	1	1	1	1	1	2	1	1	2
63	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1
66	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90	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	40.7	4.80%
05-10	113.6	13.50%
10-15	163.7	19.50%
15-20	178.7	21.30%
20-25	147.2	17.50%
25-30	93.1	11.10%
30-35	51	6.10%
35-40	25.6	3.00%
40-45	14	1.70%
45-50	7.6	0.90%
50-55	3.4	0.40%
55-60	1.3	0.20%
60-65	0.5	0.10%
65-70	0.2	0.00%
70-75	0.1	0.00%
75-80	0	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	1.14	1.12	1.1	1.08	1.12	1.1	1.08	0.95	1.06	1.04	1.03	1.02	1.01	1	0.99	0.98	0.97	0.95
2	1.1	1.05	1.02	0.99	1.08	1.04	1.01	0.91	1.01	0.98	0.96	0.98	0.96	0.94	0.95	0.93	0.92	0.9
3	1.05	1	0.95	0.92	1.03	0.98	0.94	0.86	0.96	0.93	0.9	0.93	0.91	0.88	0.91	0.89	0.87	0.86
4	1.01	0.94	0.9	0.86	0.99	0.93	0.89	0.82	0.91	0.88	0.85	0.89	0.86	0.84	0.88	0.85	0.83	0.81
5	0.97	0.9	0.85	0.81	0.95	0.89	0.84	0.78	0.87	0.83	0.8	0.86	0.82	0.79	0.84	0.81	0.79	0.77
6	0.93	0.86	0.8	0.77	0.92	0.85	0.8	0.75	0.83	0.79	0.76	0.82	0.78	0.76	0.81	0.78	0.75	0.74
7	0.89	0.82	0.77	0.73	0.88	0.81	0.76	0.71	0.8	0.75	0.72	0.79	0.75	0.72	0.78	0.74	0.72	0.7
8	0.86	0.78	0.73	0.69	0.85	0.77	0.73	0.68	0.76	0.72	0.69	0.75	0.72	0.69	0.75	0.71	0.68	0.67
9	0.83	0.75	0.7	0.66	0.82	0.74	0.69	0.65	0.73	0.69	0.66	0.73	0.69	0.66	0.72	0.68	0.66	0.64
10	0.8	0.72	0.67	0.63	0.79	0.71	0.67	0.63	0.7	0.66	0.63	0.7	0.66	0.63	0.69	0.65	0.63	0.62

Table 4. Utilisation Factor Table



Photo 1: Luminaire on goniometer mount

Signature:

Print Name:

D CHAMBERS

Date:

05/10/2016

Technical Manager

Duly authorised to sign on behalf of:

Photometric and Optical Testing Services LLP