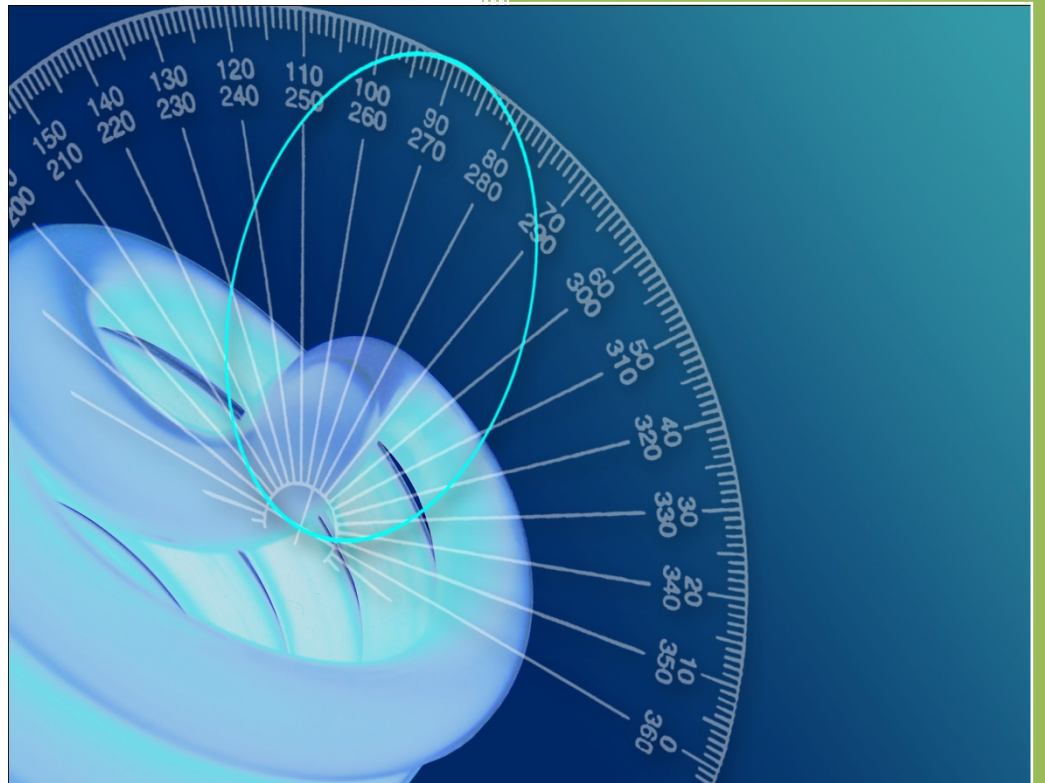


Photometric Test Report



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/DC16204	Report Date: 06/10/2016	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: LTLD8WW	Luminaire Type: DOWNLIGHT
Power Supply Used: Kikusui PCR1000M Voltage Stabiliser S/N SM01191	
Voltage(AC V) = 230.0	Current (mA)= 48
Power (Watts)= 9.93	Power factor= 0.899

Integrating Sphere Test

Date of Test: 27/09/2016	Ambient Temperature: 25°C
Measurement Filename: LTLD8WW	
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): 771.3	
CIE 1931 Chromaticity Cx: 0.4483	CIE 1931 Chromaticity Cy: 0.4153
CRI (%): 80.86	CCT (K): 2904

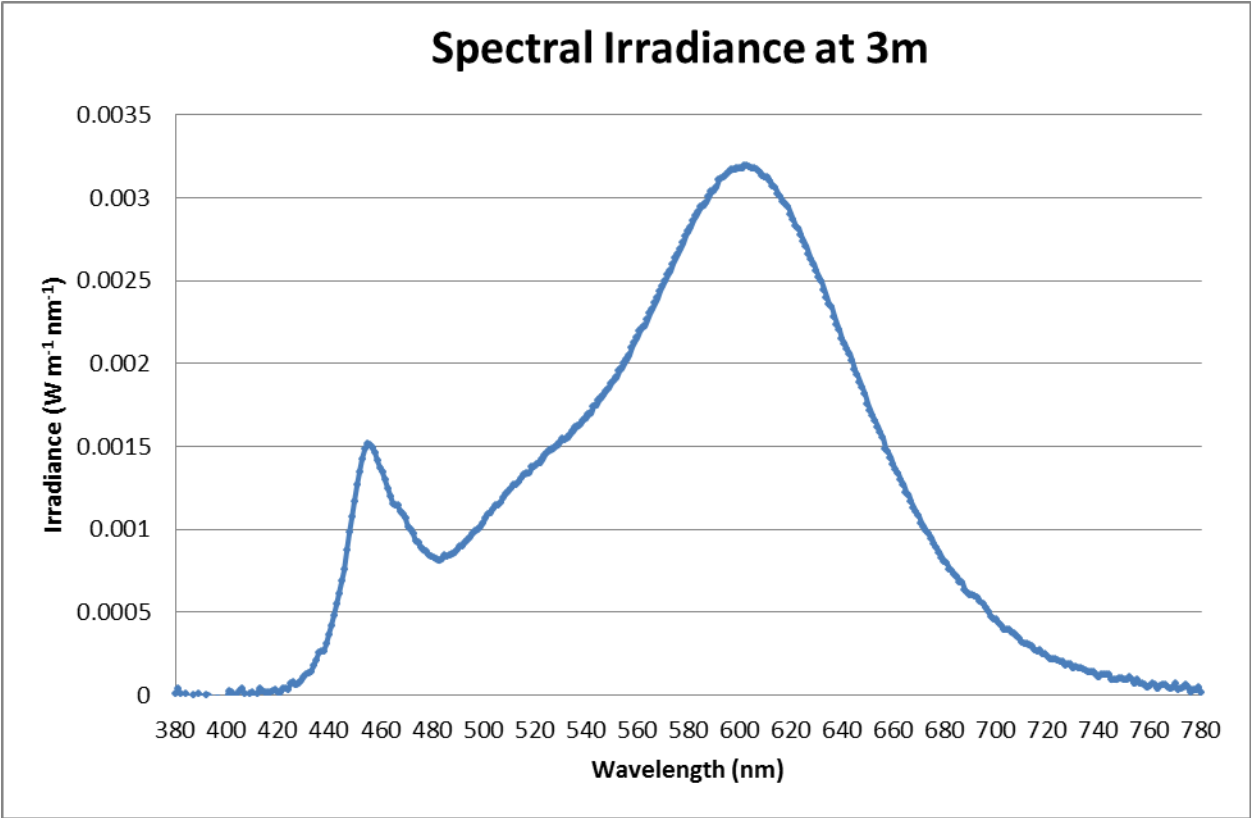


Figure 1: Spectral Irradiance



Figure 2: CIE 1931 diagram.

Goniophotometer Test		
Date of Test: 05/10/2016		Ambient Temperature: 25°C
Measurement Filename: LTLD8WW		
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 1	34-90°	4°
Azimuth	0-360°	10°
Results		
Integrated Luminous Flux (lumens): 771.3	Peak Intensity (3° Spot, candelas): 1566.2	Efficacy (lumens/Watt): 77.7
Beam Angle (50% of max intensity C0-180, degrees): 41.0		
Photometric Filename (IES LM-63-2002): LTLD8WW		
IES File – Absolute or Relative Format? ABSOLUTE		
Photometric Filename (EULUMDAT): LTLD8WW		
EULUMDAT File – Absolute or Relative Format? ABSOLUTE		

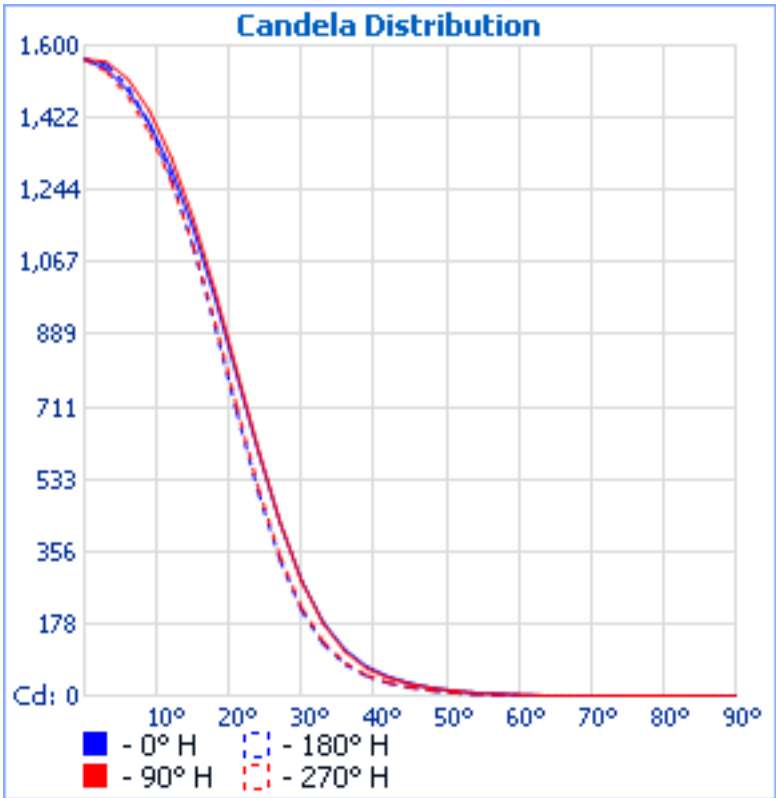


Figure 3: Far-Field Luminous Intensity (C0-180, Cartesian Coordinates)

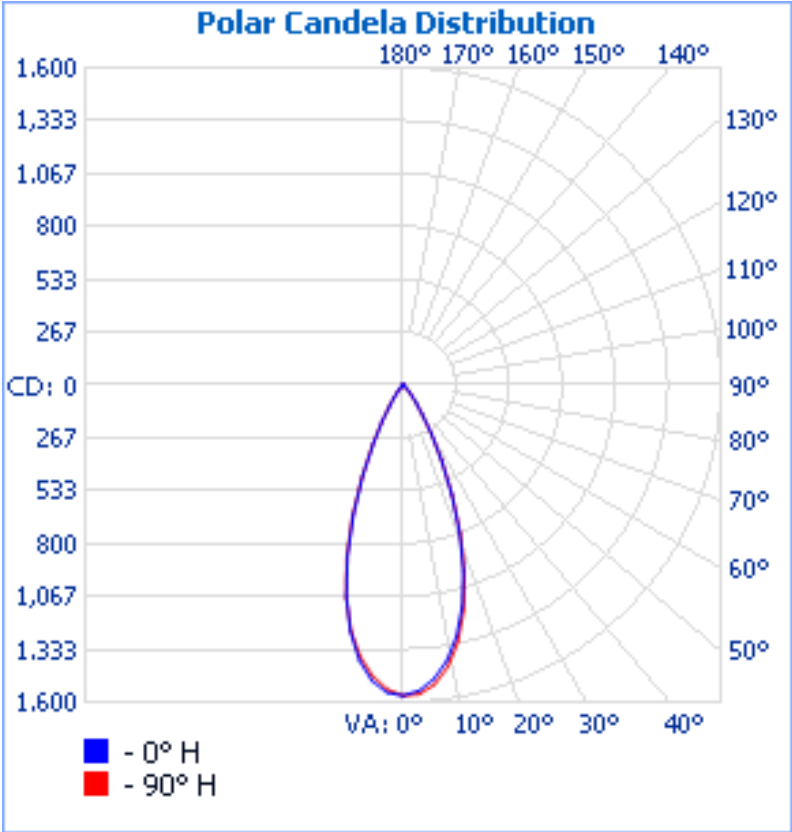


Figure 4: Far-Field Luminous Intensity (C0-180, C90-270, Polar Coordinates)

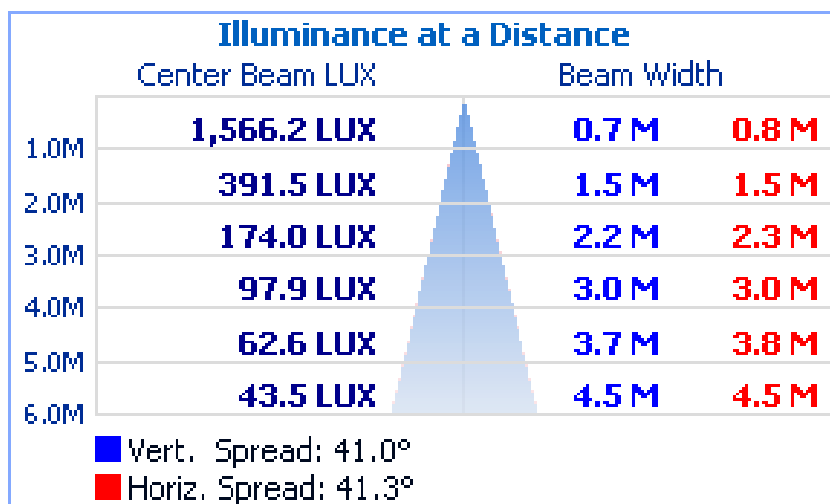


Figure 5. Cone diagram for mounting height of 6 metres.

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	18.5	19.3	18.8	19.6	19.9	16.3	17.1	16.7	17.4	17.7
	3H	18.2	18.9	18.6	19.3	19.6	16.1	16.8	16.5	17.1	17.5
	4H	18.1	18.8	18.5	19.1	19.5	16.0	16.6	16.4	17.0	17.3
	6H	18.0	18.6	18.4	19.0	19.4	15.8	16.4	16.3	16.8	17.2
	8H	17.9	18.5	18.3	18.9	19.3	15.8	16.3	16.2	16.7	17.1
	12H	17.8	18.4	18.3	18.8	19.2	15.7	16.2	16.1	16.6	17.0
4H	2H	18.1	18.8	18.5	19.1	19.5	16.0	16.6	16.4	17.0	17.3
	3H	17.9	18.4	18.3	18.8	19.2	15.7	16.2	16.1	16.6	17.0
	4H	17.8	18.2	18.2	18.6	19.1	15.6	16.0	16.0	16.5	16.9
	6H	17.6	18.0	18.1	18.4	18.9	15.4	15.8	15.9	16.3	16.7
	8H	17.5	17.9	18.0	18.3	18.8	15.3	15.7	15.8	16.2	16.7
	12H	17.4	17.8	17.9	18.3	18.8	15.3	15.6	15.8	16.1	16.6
8H	4H	17.5	17.9	18.0	18.3	18.8	15.3	15.7	15.8	16.2	16.7
	6H	17.3	17.6	17.8	18.1	18.6	15.1	15.5	15.7	16.0	16.5
	8H	17.3	17.6	17.8	18.1	18.6	15.1	15.4	15.7	15.9	16.4
	12H	17.2	17.4	17.7	17.9	18.5	15.0	15.3	15.6	15.8	16.3
12H	4H	17.4	17.8	17.9	18.3	18.8	15.3	15.6	15.8	16.1	16.6
	6H	17.3	17.6	17.8	18.1	18.6	15.1	15.4	15.7	15.9	16.4
	8H	17.2	17.4	17.7	17.9	18.5	15.0	15.3	15.6	15.8	16.3

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	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566
3	1543	1545	1545	1551	1551	1553	1556	1557	1559	1560	1560	1561	1560	1559	1558	1559	1554	1554	1552
6	1489	1490	1499	1503	1505	1506	1511	1514	1516	1518	1518	1518	1517	1514	1514	1514	1510	1501	1499
9	1407	1406	1415	1412	1418	1423	1429	1435	1438	1439	1439	1436	1432	1426	1421	1414	1418	1406	1405
12	1295	1294	1297	1302	1317	1317	1319	1320	1323	1324	1321	1317	1315	1312	1309	1290	1281	1275	1273
15	1152	1148	1160	1162	1165	1174	1173	1177	1173	1175	1169	1170	1161	1158	1143	1133	1125	1106	1105
18	982	994	984	996	988	997	998	1004	1007	998	1002	992	979	971	951	950	927	931	911
21	793	804	804	815	811	806	813	821	813	803	806	806	787	769	761	753	730	719	701
24	601	611	615	602	614	615	612	620	614	607	606	602	582	572	557	529	529	515	501
27	427	438	432	434	441	441	438	433	433	428	425	415	408	398	385	362	349	348	334
30	283	292	292	296	293	288	291	292	288	282	281	276	264	250	243	234	222	218	210
33	181	186	189	193	192	186	184	181	181	177	175	168	163	156	151	145	136	131	128
36	114	116	118	124	122	119	116	111	110	109	106	102	100	96	92	88	81	78	78
39	73	74	77	76	77	76	73	71	69	68	66	65	62	60	56	52	51	49	49
42	48	48	50	51	52	50	48	46	45	44	43	42	42	40	38	35	33	32	32
45	31	32	33	35	35	33	32	31	30	29	29	29	28	26	25	23	21	21	21
48	20	21	23	23	23	22	22	21	19	20	19	19	19	17	16	15	14	13	13
51	13	14	14	15	15	15	14	13	13	13	13	13	12	11	10	9	8	8	7
54	8	9	9	9	10	10	9	9	8	8	8	8	7	7	6	5	5	5	4
57	5	6	6	6	6	6	6	6	5	5	5	5	5	4	4	3	3	3	3
60	3	3	4	4	4	4	3	3	3	3	3	3	3	3	2	2	2	2	2
63	2	2	2	3	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
66	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
69	0	0	1	1	1	1	1	1	1	0	1	0	0	1	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	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566	1566
3	1550	1546	1547	1543	1540	1539	1538	1537	1537	1536	1535	1535	1535	1536	1540	1538	1541
6	1493	1495	1491	1485	1480	1480	1477	1475	1475	1475	1476	1478	1477	1481	1485	1487	1484
9	1395	1396	1383	1382	1381	1382	1384	1385	1386	1388	1388	1388	1389	1390	1391	1401	1399
12	1261	1254	1251	1262	1258	1257	1256	1260	1265	1267	1270	1277	1282	1289	1281	1283	1287
15	1088	1092	1086	1085	1093	1091	1099	1099	1109	1111	1123	1127	1137	1137	1141	1146	1141
18	911	888	894	882	892	895	908	921	922	938	942	945	954	955	972	968	986
21	699	688	692	685	681	693	711	713	714	732	749	749	752	768	783	783	793
24	497	491	474	484	486	488	505	508	512	526	539	539	553	564	563	588	597
27	333	320	318	325	326	328	330	338	344	352	357	367	379	390	393	403	423
30	209	203	204	203	200	205	210	215	217	225	232	234	237	249	259	266	279
33	127	126	128	127	124	124	125	130	133	138	141	145	149	159	165	169	176
36	76	76	80	78	77	77	76	78	82	84	87	92	95	99	104	104	109
39	48	49	48	48	48	48	49	49	51	53	56	57	61	62	63	67	69
42	31	31	31	32	31	31	31	31	33	34	36	38	39	41	41	43	45
45	20	20	20	20	20	20	20	20	21	22	23	25	26	27	27	28	29
48	13	13	13	13	12	12	13	13	14	14	15	16	16	17	18	18	19
51	8	7	8	8	7	8	8	8	8	9	9	10	10	10	11	11	12
54	5	5	5	5	5	4	5	4	5	5	5	5	6	6	6	7	7
57	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4
60	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
63	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
66	1	1	1	1	1	0	1	0	0	1	1	1	1	0	0	1	1
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	36.9	4.70%
05-10	102.9	13.20%
10-15	148	18.90%
15-20	161.9	20.70%
20-25	136.2	17.40%
25-30	90.4	11.60%
30-35	51.7	6.60%
35-40	25.8	3.30%
40-45	13.8	1.80%
45-50	7.6	1.00%
50-55	3.7	0.50%
55-60	1.7	0.20%
60-65	0.8	0.10%
65-70	0.3	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	1.07	1.04	1	0.91	1	0.98	0.96	0.97	0.95	0.94	0.95	0.93	0.92	0.9
3	1.05	0.99	0.95	0.92	1.03	0.98	0.94	0.86	0.95	0.92	0.89	0.93	0.9	0.88	0.91	0.89	0.87	0.85
4	1.01	0.94	0.89	0.86	0.99	0.93	0.89	0.82	0.91	0.87	0.84	0.89	0.86	0.83	0.87	0.85	0.82	0.81
5	0.97	0.89	0.84	0.81	0.95	0.88	0.84	0.78	0.87	0.83	0.8	0.85	0.82	0.79	0.84	0.81	0.78	0.77
6	0.93	0.85	0.8	0.76	0.91	0.84	0.79	0.74	0.83	0.79	0.75	0.82	0.78	0.75	0.8	0.77	0.74	0.73
7	0.89	0.81	0.76	0.72	0.88	0.8	0.76	0.71	0.79	0.75	0.72	0.78	0.74	0.71	0.77	0.74	0.71	0.7
8	0.86	0.77	0.72	0.69	0.84	0.77	0.72	0.68	0.76	0.71	0.68	0.75	0.71	0.68	0.74	0.7	0.68	0.67
9	0.82	0.74	0.69	0.66	0.81	0.74	0.69	0.65	0.73	0.68	0.65	0.72	0.68	0.65	0.71	0.67	0.65	0.64
10	0.79	0.71	0.66	0.63	0.78	0.71	0.66	0.62	0.7	0.65	0.62	0.69	0.65	0.62	0.68	0.65	0.62	0.61

Table 4. Utilisation Factor Table



Photo 1: Luminaire on goniometer mount

Signature:

A handwritten signature in black ink, appearing to read "D Chambers", is written on a light blue background with faint vertical lines.

Print Name:

D CHAMBERS

Date:

06/10/2016

Technical Manager

Duly authorised to sign on behalf of:

Photometric and Optical Testing Services LLP