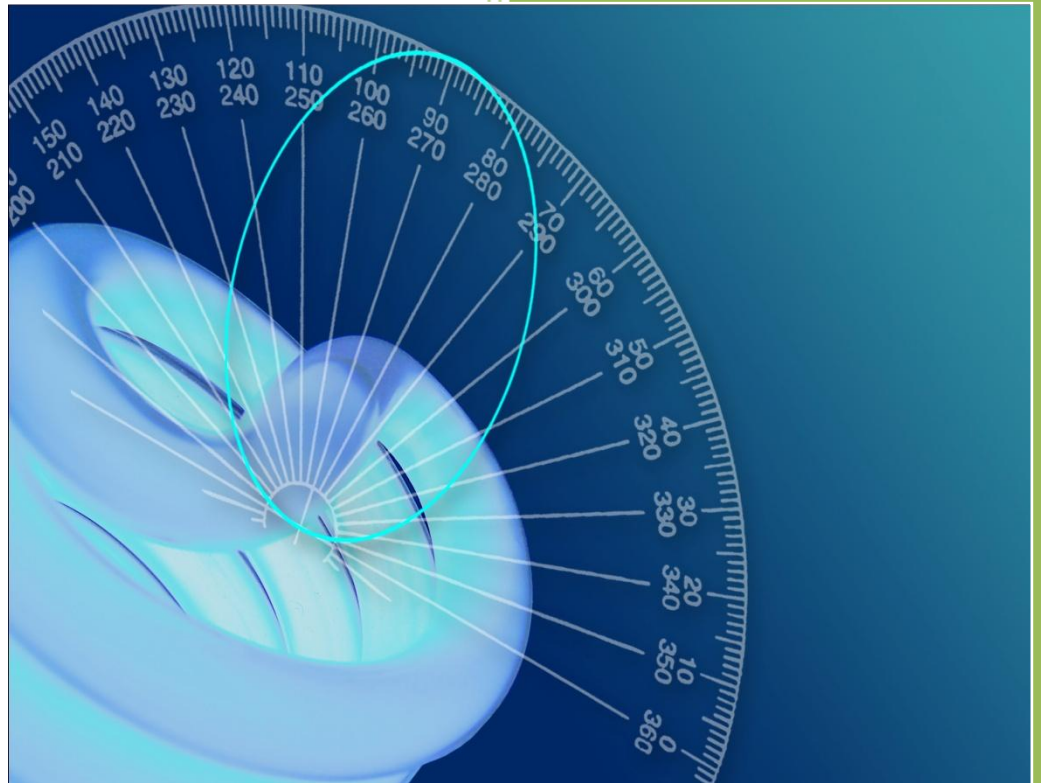


# Photometric Test Report



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/DC15227	Report Date: 01/12/2015	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: Thistle Down Barn, Holcot Lane, Sywell, Northampton, NN6 0BG		

### 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: LEDLITE	Source Type: LED
Model: LTSP50DL	Luminaire Type: DOWNLIGHT
Power Supply Used: Kikusui PCR1000M Voltage Stabiliser S/N SM01191	
Voltage(AC V) = 230.0	Current (mA)= 227
Power (Watts)= 50.8	Power factor= 0.973

### Integrating Sphere Test

Date of Test: 26/11/2015	Ambient Temperature:25°C
Measurement Filename: 50W LED DAYLIGHT	
Instrument Used: Labsphere model 2m integrating sphere spectroradiometer AS-02949-012	
Integrating Sphere Size: 2m	Measurement Geometry ( $2\pi$ / $4\pi$ ): $4\pi$
Sample Orientation: Horizontal	Auxiliary Correction Applied: YES
Comments:	
Date of Last Calibration (Operating Hours): 12-10-2015 (0:57)	Spectral Flux Standard Lamp Used: SCL-600
Standard Lamp Serial Number: L123	Traceable: to NIST standards
Calibration Certificate Number: SCL-600-L123	Calibration Certificate Date: 29/01/2014
Calibration Lamp Uncertainty: $\pm 0.67\%$ ( $k=2$ )	
<b>Results</b>	
Flux (lumens): 4775	
CIE 1931 Chromaticity Cx: 0.3243	CIE 1931 Chromaticity Cy: 0.3492
CRI (%):83.38	CCT (K): 5847

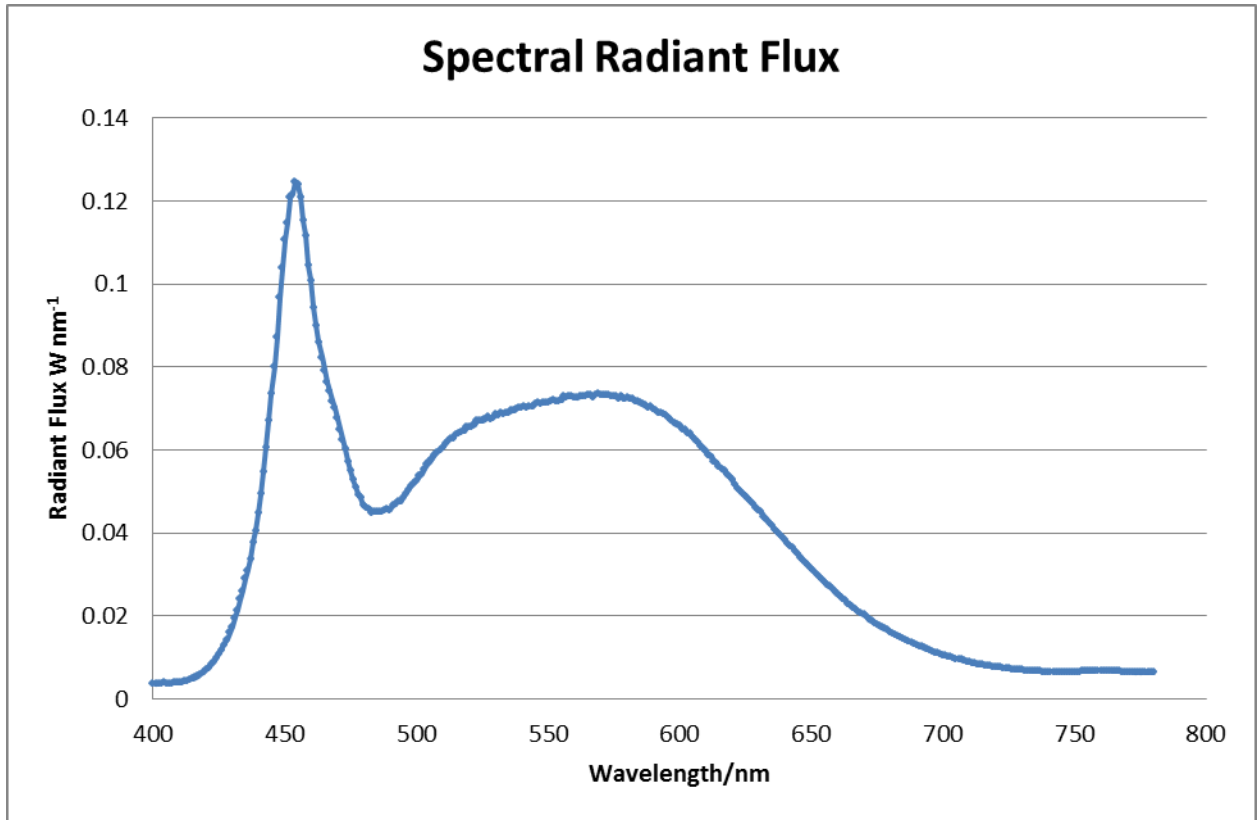


Figure 1: Spectral Flux

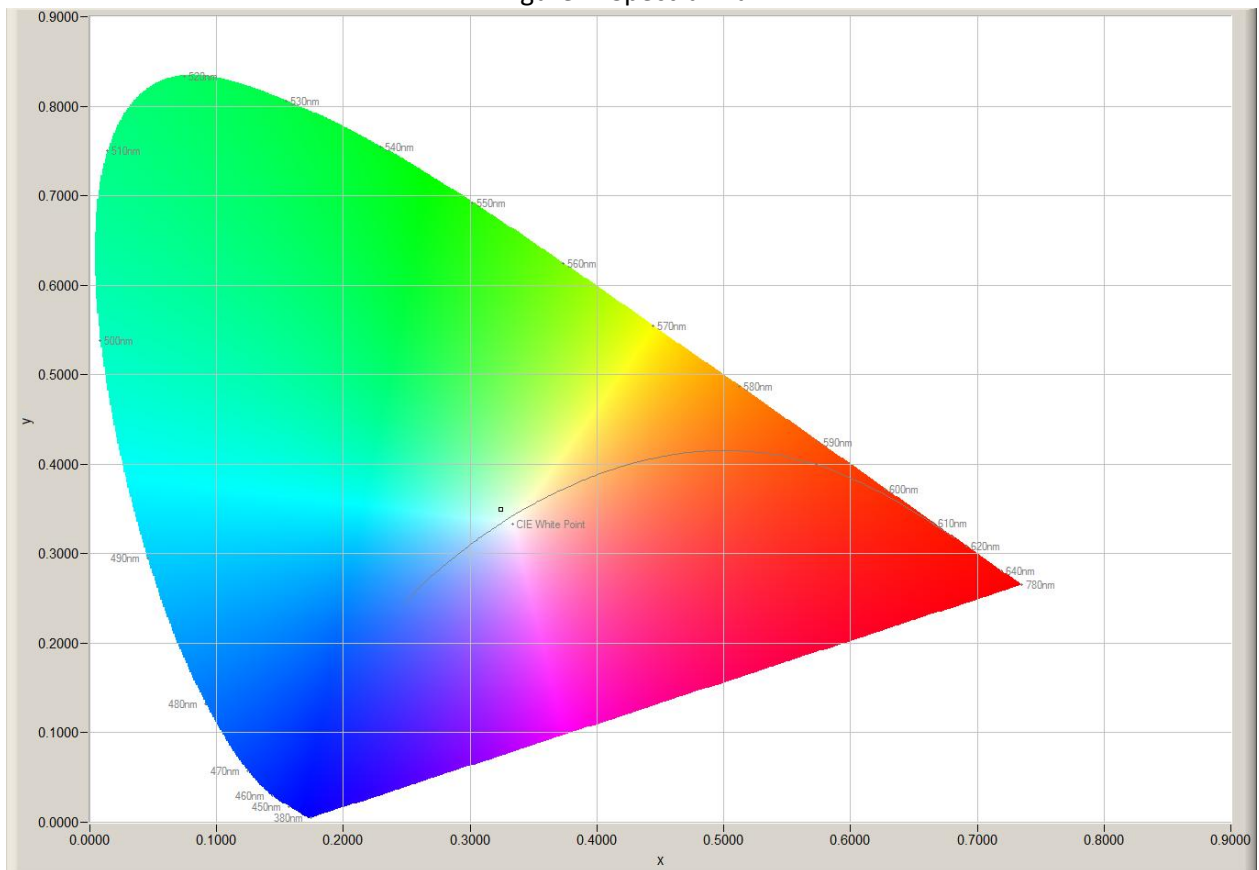


Figure 2: CIE 1931 diagram.

Goniophotometer Test		
Date of Test: 25/11/2015	Ambient Temperature: 25°C	
Measurement Filename: 50W LED DAYLIGHT		
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: Specbos1211	Reference Photometer Serial Number: 2014754	
Traceable: to NIST standards		
Calibration Certificate Date: 18 June 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	0-90°	3°
Azimuth	0-360°	10°
Results		
Integrated Luminous Flux (lumens):5847	Peak Intensity (3° Spot, candelas): 1764.2	Efficacy (lumens/Watt): 115
Beam Angle (50% of max intensity C0-180, degrees): 107.5		
Photometric Filename (IES LM-63-2002): 50W LED DAYLIGHT		
IES File – Absolute or Relative Format? ABSOLUTE		
Photometric Filename (EULUMDAT): 50W LED DAYLIGHT		
EULUMDAT File – Absolute or Relative Format? ABSOLUTE		

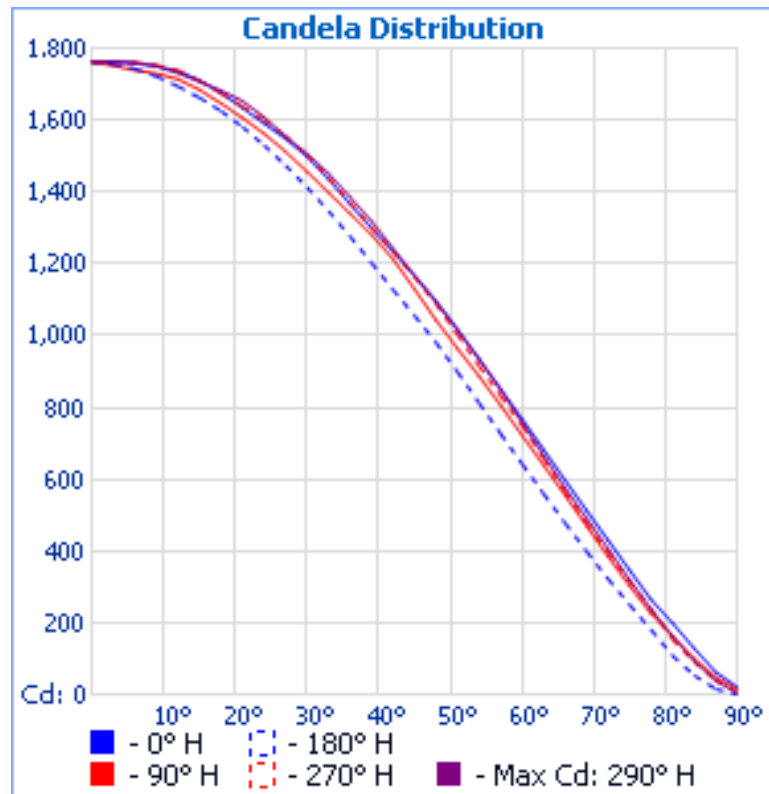


Figure 3: Far-Field Luminous Intensity (C0-180, Cartesian Coordinates)

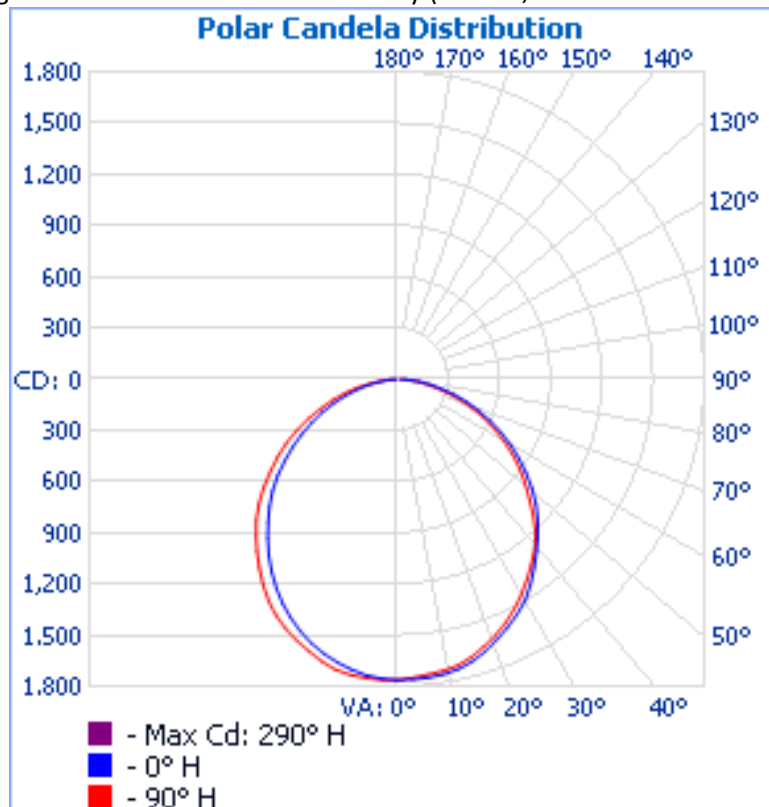


Figure 4: Far-Field Luminous Intensity (C0-180, C90-270, Polar Coordinates)

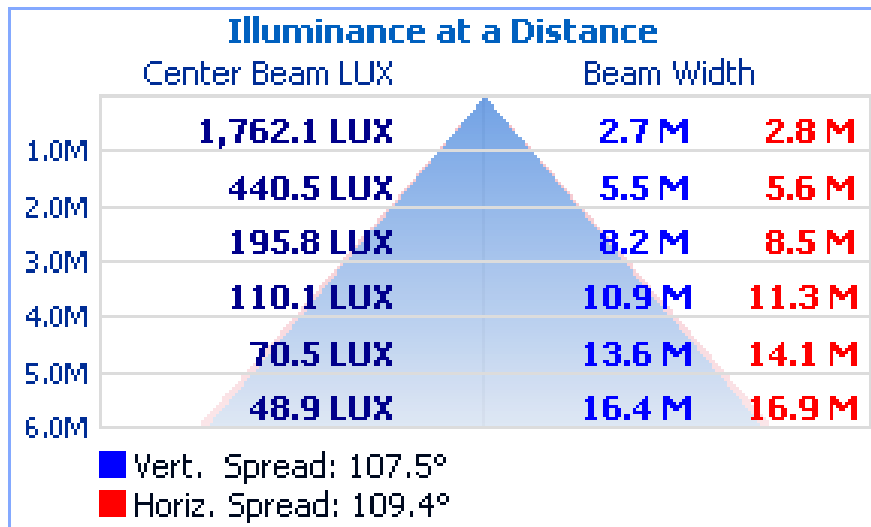


Figure 5. Cone diagram for mounting height of 6 metres.

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	18.3	20.0	18.7	20.3	20.6	18.2	19.8	18.6	20.1	20.5
	3H	19.9	21.4	20.3	21.7	22.1	19.7	21.2	20.1	21.5	21.9
	4H	20.6	22.0	21.0	22.3	22.7	20.3	21.7	20.7	22.1	22.4
	6H	21.1	22.4	21.5	22.8	23.2	20.8	22.1	21.2	22.4	22.8
	8H	21.3	22.5	21.7	22.9	23.3	20.9	22.1	21.3	22.5	22.9
	12H	21.4	22.6	21.8	23.0	23.4	20.9	22.1	21.4	22.5	22.9
4H	2H	19.0	20.4	19.4	20.8	21.1	18.9	20.3	19.3	20.6	21.0
	3H	20.8	22.0	21.2	22.4	22.8	20.6	21.8	21.0	22.1	22.6
	4H	21.6	22.6	22.0	23.1	23.5	21.4	22.4	21.8	22.8	23.3
	6H	22.2	23.1	22.7	23.6	24.0	21.9	22.8	22.3	23.3	23.7
	8H	22.5	23.3	22.9	23.8	24.2	22.0	22.9	22.5	23.4	23.8
	12H	22.7	23.5	23.1	23.9	24.4	22.2	23.0	22.6	23.4	23.9
8H	4H	21.9	22.7	22.3	23.2	23.6	21.6	22.5	22.1	22.9	23.4
	6H	22.6	23.3	23.1	23.8	24.3	22.2	23.0	22.7	23.4	23.9
	8H	23.0	23.6	23.5	24.1	24.6	22.5	23.2	23.0	23.7	24.2
	12H	23.2	23.8	23.8	24.3	24.8	22.7	23.2	23.2	23.7	24.2
12H	4H	21.9	22.7	22.4	23.1	23.6	21.7	22.5	22.1	22.9	23.4
	6H	22.7	23.3	23.2	23.8	24.3	22.4	23.0	22.9	23.5	24.0
	8H	23.1	23.6	23.6	24.1	24.6	22.6	23.1	23.1	23.6	24.2

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	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762
3	1762	1762	1761	1760	1759	1757	1756	1754	1753	1752	1751	1750	1750	1749	1750	1752	1753	1755	1756
6	1758	1757	1757	1756	1754	1752	1749	1746	1743	1740	1736	1733	1731	1730	1731	1734	1737	1739	1743
9	1751	1747	1745	1742	1741	1739	1737	1735	1733	1730	1725	1719	1713	1708	1706	1707	1712	1716	1722
12	1737	1729	1723	1720	1720	1717	1714	1713	1714	1714	1710	1702	1694	1688	1685	1682	1685	1689	1694
15	1711	1700	1694	1691	1691	1688	1683	1681	1683	1685	1680	1674	1667	1664	1659	1657	1658	1659	1663
18	1676	1670	1661	1663	1662	1657	1649	1646	1649	1647	1642	1635	1632	1632	1628	1627	1623	1626	1626
21	1635	1635	1629	1630	1630	1621	1615	1615	1614	1607	1600	1595	1593	1593	1593	1589	1578	1576	1581
24	1591	1596	1586	1576	1584	1578	1573	1578	1575	1563	1554	1549	1545	1548	1544	1534	1525	1519	1530
27	1548	1546	1528	1523	1534	1528	1525	1527	1523	1512	1505	1500	1496	1497	1489	1481	1472	1466	1474
30	1499	1487	1472	1473	1477	1467	1469	1470	1462	1457	1454	1455	1442	1438	1427	1426	1426	1413	1413
33	1436	1432	1420	1421	1420	1410	1412	1406	1398	1399	1398	1395	1381	1376	1368	1367	1369	1353	1347
36	1367	1374	1362	1361	1357	1355	1355	1340	1333	1340	1334	1322	1318	1309	1299	1300	1294	1284	1277
39	1300	1302	1299	1285	1289	1292	1289	1279	1270	1281	1270	1253	1253	1242	1225	1217	1220	1212	1203
42	1234	1221	1225	1214	1219	1214	1217	1210	1202	1213	1199	1178	1188	1177	1160	1147	1140	1137	1128
45	1168	1149	1146	1145	1143	1134	1140	1137	1126	1130	1120	1103	1113	1103	1081	1079	1059	1062	1056
48	1096	1081	1071	1076	1067	1060	1063	1061	1048	1043	1039	1033	1035	1018	999	1009	990	984	981
51	1017	1013	986	1004	989	985	987	980	975	964	964	958	958	935	929	931	916	907	899
54	934	935	913	916	900	904	903	906	892	887	882	878	877	856	854	836	843	821	813
57	851	852	829	832	816	818	822	825	807	806	802	793	798	777	774	756	754	733	727
60	768	765	741	743	735	731	736	736	721	722	722	710	709	695	680	675	666	646	643
63	683	681	664	658	654	646	649	648	641	639	638	628	622	610	589	596	589	564	559
66	597	594	572	575	573	560	560	560	562	555	547	543	537	526	514	519	494	483	478
69	513	504	488	477	480	471	476	471	478	470	458	461	452	441	434	427	409	401	398
72	430	413	407	394	398	392	395	388	393	384	379	381	373	363	362	349	334	322	322
75	347	329	322	316	313	315	308	307	309	303	300	298	295	291	285	275	259	248	250
78	265	252	242	241	233	234	233	230	230	225	225	219	223	216	212	206	192	179	180
81	199	187	186	179	175	175	174	172	166	163	159	159	153	151	145	141	132	110	108
84	129	122	109	108	101	102	109	103	103	101	97	97	90	85	81	85	73	65	54
87	63	56	44	39	46	46	47	42	46	48	41	36	35	35	35	30	29	28	16
90	22	12	9	11	10	8	9	8	10	16	8	7	6	8	6	6	5	9	1

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	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762	1762
3	1758	1758	1760	1761	1762	1763	1763	1764	1764	1764	1764	1764	1764	1764	1764	1763	1763
6	1746	1750	1752	1754	1755	1757	1759	1760	1760	1760	1760	1760	1760	1761	1761	1760	1759
9	1725	1730	1731	1736	1741	1746	1751	1753	1754	1753	1751	1749	1750	1752	1755	1756	1754
12	1697	1699	1704	1713	1719	1725	1731	1736	1739	1736	1731	1728	1730	1737	1741	1744	1741
15	1662	1666	1670	1676	1685	1689	1695	1702	1710	1710	1707	1703	1703	1708	1717	1720	1716
18	1628	1626	1632	1637	1646	1648	1652	1664	1674	1682	1683	1681	1677	1679	1687	1683	1682
21	1587	1587	1593	1600	1606	1609	1620	1633	1639	1649	1654	1653	1647	1648	1654	1644	1637
24	1542	1543	1541	1552	1560	1562	1585	1601	1601	1608	1609	1605	1604	1604	1608	1599	1590
27	1491	1486	1485	1498	1509	1511	1532	1549	1556	1559	1554	1556	1560	1558	1559	1546	1546
30	1429	1423	1425	1437	1450	1463	1478	1487	1502	1506	1506	1509	1510	1506	1504	1493	1497
33	1355	1358	1365	1381	1391	1411	1419	1432	1439	1452	1452	1451	1453	1451	1444	1439	1441
36	1281	1292	1304	1321	1324	1350	1351	1377	1371	1395	1386	1388	1393	1393	1382	1383	1381
39	1219	1225	1226	1253	1252	1278	1284	1309	1302	1329	1319	1320	1331	1330	1309	1323	1319
42	1154	1144	1154	1185	1179	1204	1214	1227	1234	1253	1243	1251	1256	1260	1241	1250	1250
45	1073	1065	1078	1105	1104	1122	1140	1144	1164	1173	1167	1173	1176	1178	1169	1172	1173
48	988	993	998	1021	1029	1044	1059	1063	1088	1093	1093	1094	1095	1097	1094	1096	1094
51	910	911	924	939	951	971	974	987	1002	1016	1015	1014	1017	1020	1020	1011	1018
54	827	838	841	848	868	885	898	904	915	932	935	930	938	932	932	944	934
57	740	751	765	769	786	799	819	824	832	845	849	846	851	849	850	862	850
60	653	662	686	689	708	710	730	742	749	753	758	751	757	760	766	768	765
63	571	586	604	603	620	624	640	658	657	665	666	663	664	669	680	682	680
66	489	496	521	523	534	540	551	566	565	576	576	579	579	588	592	584	594
69	403	416	428	440	451	462	466	475	478	487	491	490	491	499	493	499	510
72	319	344	352	370	374	381	388	393	396	404	406	404	408	414	409	418	426
75	245	269	280	290	298	294	310	310	316	320	319	319	326	324	328	332	339
78	179	194	210	215	220	218	231	231	238	240	238	242	242	243	249	249	255
81	108	128	136	139	142	141	148	146	154	155	163	160	164	168	175	180	185
84	58	68	78	74	77	78	84	85	91	93	94	92	94	93	103	103	123
87	20	24	27	27	26	31	33	34	40	42	39	34	37	37	36	42	52
90	3	5	2	4	3	2	3	7	8	7	5	5	6	7	7	10	14

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



Zone	Lumens	% Total
0-5	42.2	0.90%
05-10	124.1	2.60%
10-15	202.9	4.20%
15-20	273.9	5.70%
20-25	332.7	6.90%
25-30	382.3	7.90%
30-35	418.1	8.70%
35-40	434.8	9.00%
40-45	440.3	9.10%
45-50	430.9	8.90%
50-55	403	8.30%
55-60	365.5	7.60%
60-65	317.6	6.60%
65-70	255.4	5.30%
70-75	192.1	4.00%
75-80	129.5	2.70%
80-85	67.1	1.40%
85-90	18.6	0.40%

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	1.09	1.04	1	0.96	1.06	1.02	0.98	0.85	0.98	0.94	0.92	0.94	0.91	0.89	0.9	0.88	0.86	0.84	
2	0.99	0.91	0.84	0.78	0.96	0.89	0.83	0.71	0.85	0.8	0.76	0.82	0.78	0.74	0.79	0.75	0.72	0.7	
3	0.9	0.8	0.72	0.65	0.88	0.78	0.71	0.61	0.75	0.69	0.64	0.73	0.67	0.62	0.7	0.65	0.61	0.59	
4	0.83	0.71	0.62	0.55	0.8	0.69	0.61	0.52	0.67	0.6	0.54	0.65	0.58	0.53	0.62	0.57	0.53	0.51	
5	0.76	0.63	0.54	0.48	0.74	0.62	0.54	0.46	0.6	0.53	0.47	0.58	0.52	0.46	0.56	0.51	0.46	0.44	
6	0.7	0.57	0.48	0.42	0.68	0.56	0.48	0.4	0.54	0.47	0.41	0.53	0.46	0.41	0.51	0.45	0.4	0.38	
7	0.65	0.52	0.43	0.37	0.63	0.51	0.43	0.36	0.49	0.42	0.36	0.48	0.41	0.36	0.47	0.41	0.36	0.34	
8	0.61	0.47	0.39	0.33	0.59	0.47	0.38	0.32	0.45	0.38	0.33	0.44	0.37	0.32	0.43	0.37	0.32	0.3	
9	0.57	0.43	0.35	0.3	0.55	0.43	0.35	0.29	0.42	0.34	0.29	0.41	0.34	0.29	0.4	0.33	0.29	0.27	
10	0.53	0.4	0.32	0.27	0.52	0.4	0.32	0.26	0.39	0.32	0.27	0.38	0.31	0.27	0.37	0.31	0.26	0.25	

Table 4. Utilisation Factor Table

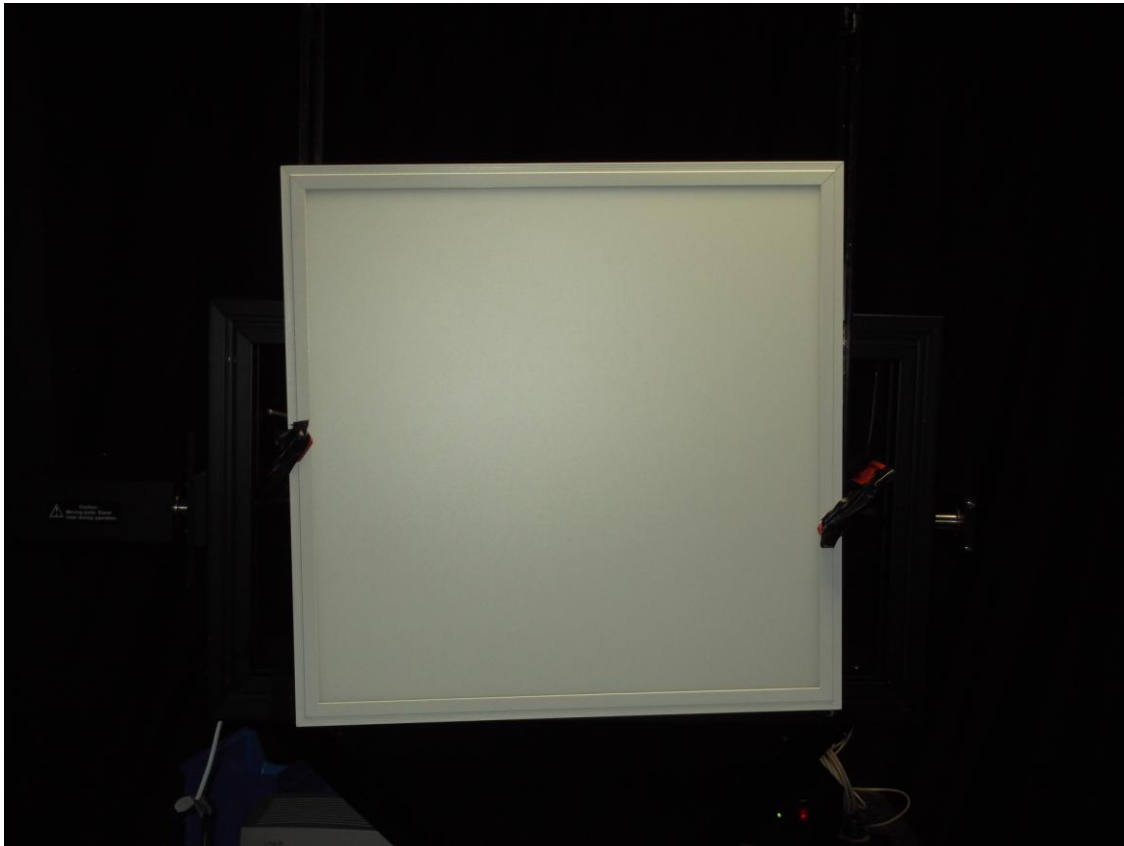


Photo 1: Luminaire on goniometer mount

Signature:

A handwritten signature in black ink on a white background. The signature is cursive and appears to read "D Chambers".

---

Print Name:

D CHAMBERS

---

Date:

01/12/2015

---

Test Engineer

*Duly authorised to sign on behalf of:*

Photometric and Optical Testing Services LLP