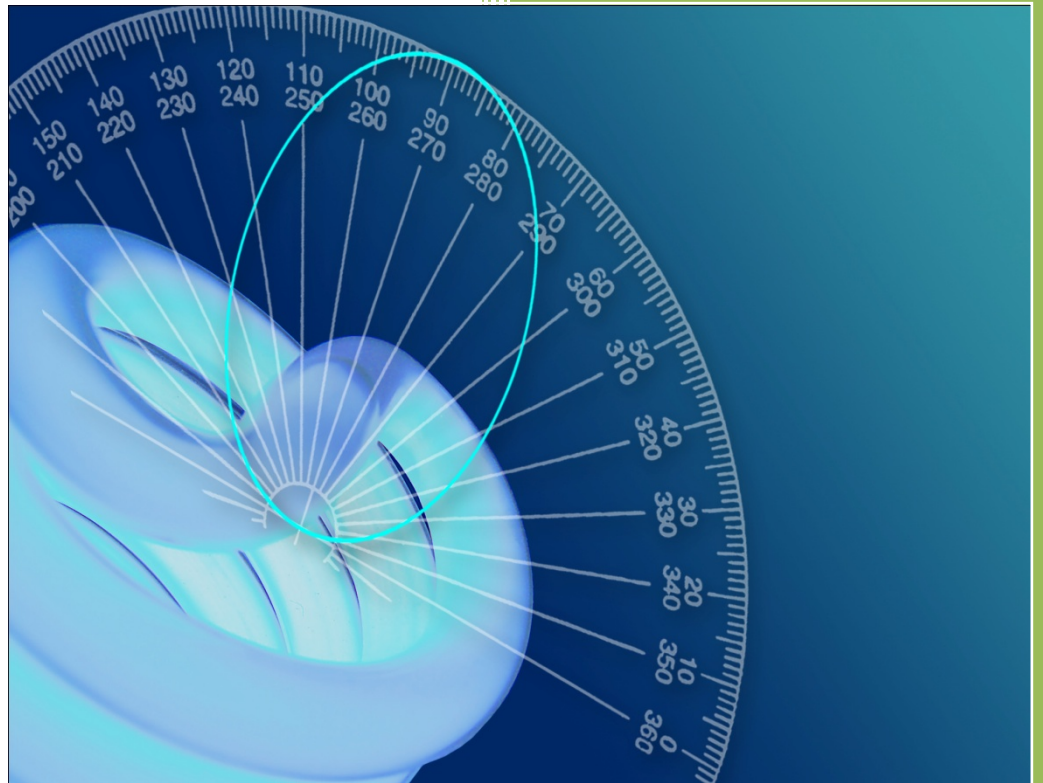


Photometric Test Report



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/DC18012	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 25 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 25 DEG OPTIC	
Instrument Used: Labsphere model CSLMS HALOGEN 4060 integrating sphere spectroradiometer	
Integrating Sphere Size: 1m	Measurement Geometry ($2\pi / 4\pi$): 2π
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 th February 2010
Calibration Lamp Uncertainty: $\pm 0.67\%$ ($k=2$)	
Results	
Flux (lumens): 238.9	
CIE 1931 Chromaticity Cx: 0.3793	CIE 1931 Chromaticity Cy: 0.3749
CRI (%): 77.28	CCT (K): 4015

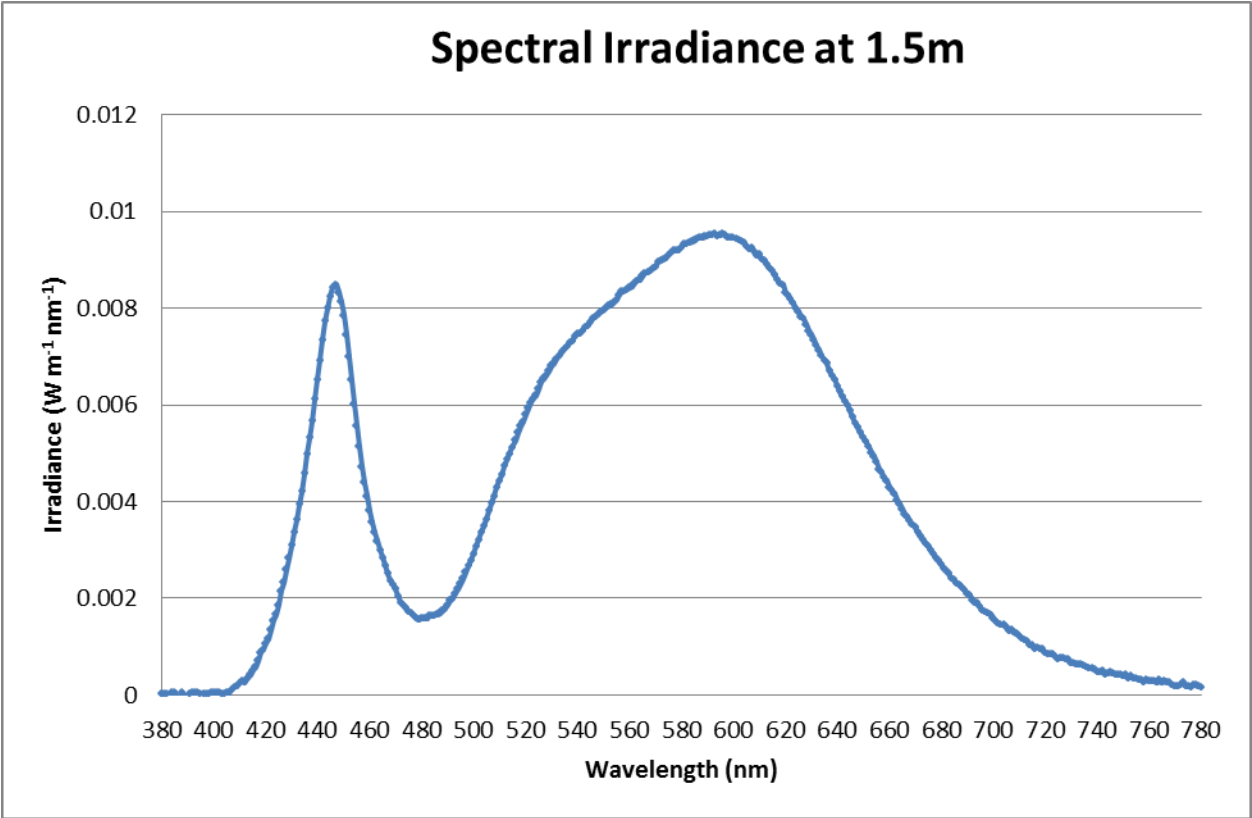


Figure 1: Spectral Irradiance

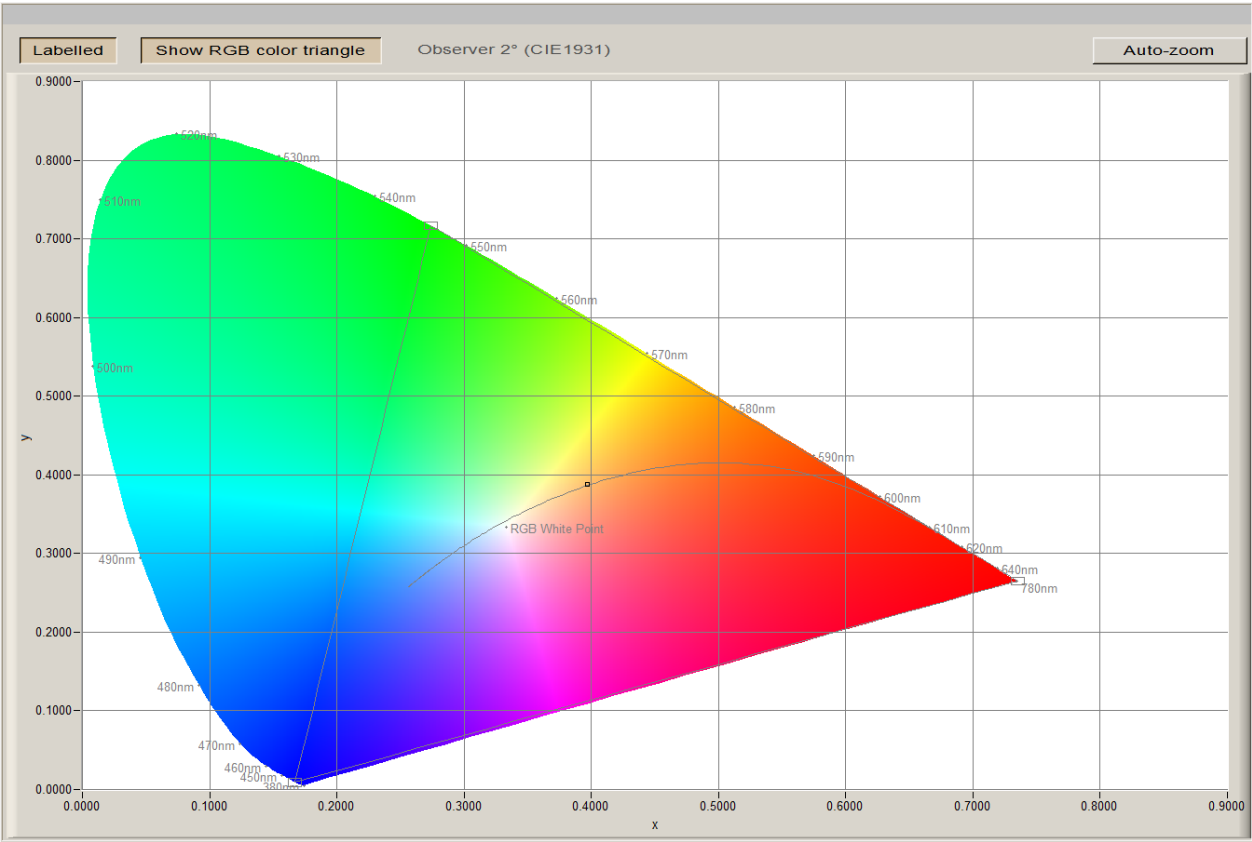


Figure 2: CIE 1931 diagram.

Goniophotometer Test		
Date of Test: 04/01/2018		Ambient Temperature: 25°C
Measurement Filename: WHITE 25 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: ± 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	22.5-50°	2.5°
Inclination Zone 3	55-90°	5°
Azimuth	0-360°	10°
Results		
Integrated Luminous Flux (lumens):238.9	Peak Intensity (3° Spot, candelas): 1518.9	Efficacy (lumens/Watt): 50.8
Beam Angle (50% of max intensity C0-180, degrees): 18.1		
Photometric Filename (IES LM-63-2002): WHITE 25 DEG OPTIC		
IES File – Absolute or Relative Format? Absolute		
Photometric Filename (EULUMDAT): WHITE 25 DEG OPTIC		
EULUMDAT File – Absolute or Relative Format? Absolute		

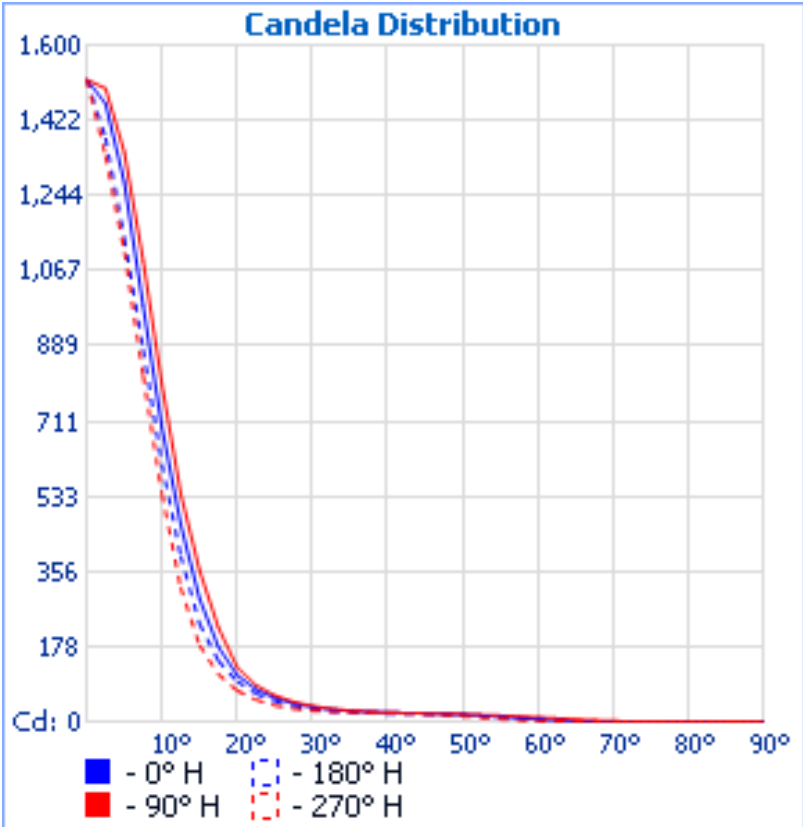


Figure 3: Far-Field Luminous Intensity (C0-180, Cartesian Coordinates)

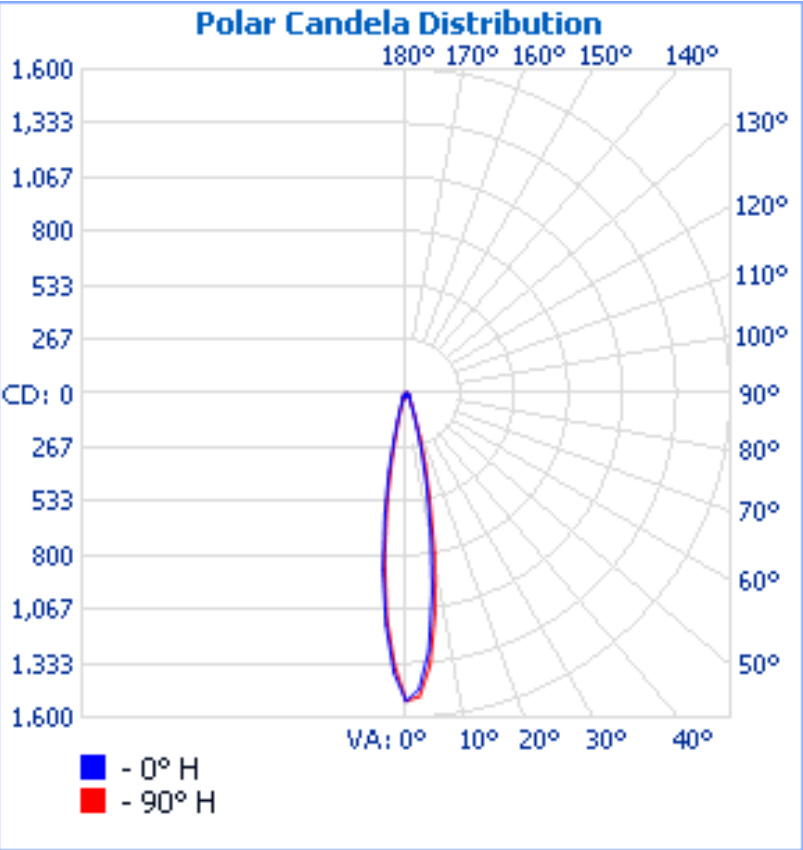


Figure 4: Far-Field Luminous Intensity (C0-180, C90-270, Polar Coordinates)

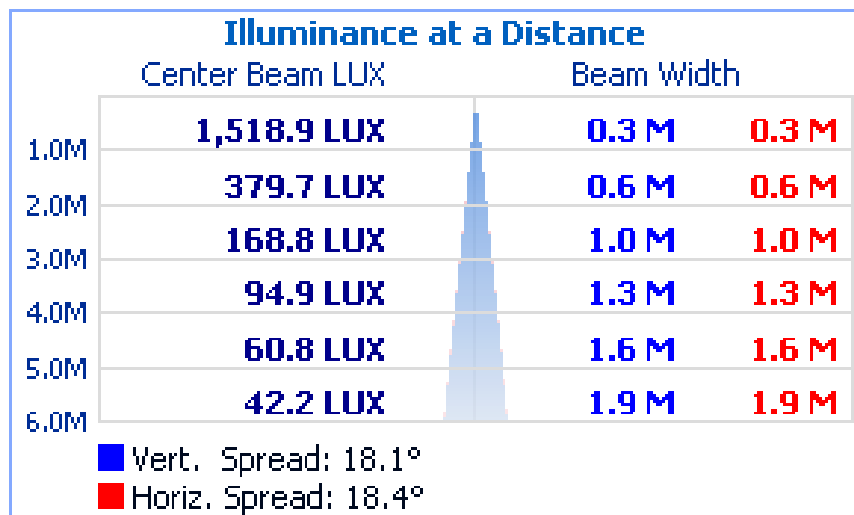


Figure 5. Cone diagram for mounting height of 6 metres.

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	16.6	17.4	16.9	17.7	18.0	14.2	15.1	14.6	15.4	15.7
	3H	16.4	17.1	16.7	17.4	17.8	14.0	14.7	14.4	15.1	15.4
	4H	16.2	16.9	16.6	17.3	17.6	13.9	14.6	14.3	14.9	15.3
	6H	16.1	16.7	16.5	17.1	17.5	13.8	14.4	14.2	14.8	15.2
	8H	16.0	16.6	16.5	17.0	17.4	13.7	14.3	14.1	14.7	15.1
	12H	16.0	16.5	16.4	16.9	17.3	13.6	14.2	14.0	14.6	15.0
4H	2H	16.5	17.2	16.9	17.6	17.9	14.0	14.7	14.4	15.1	15.4
	3H	16.3	16.9	16.7	17.3	17.7	13.8	14.3	14.2	14.7	15.1
	4H	16.2	16.7	16.6	17.1	17.6	13.7	14.1	14.1	14.6	15.0
	6H	16.0	16.5	16.5	16.9	17.4	13.5	13.9	14.0	14.4	14.8
	8H	16.0	16.4	16.5	16.8	17.3	13.4	13.8	13.9	14.3	14.8
	12H	15.9	16.3	16.4	16.7	17.3	13.4	13.7	13.9	14.2	14.7
8H	4H	16.0	16.4	16.5	16.8	17.3	13.4	13.8	13.9	14.3	14.8
	6H	15.8	16.1	16.3	16.6	17.1	13.2	13.6	13.7	14.1	14.6
	8H	15.8	16.0	16.3	16.6	17.1	13.2	13.5	13.7	14.0	14.5
	12H	15.7	15.9	16.2	16.4	16.9	13.1	13.4	13.7	13.9	14.4
12H	4H	15.9	16.3	16.4	16.7	17.3	13.4	13.7	13.9	14.2	14.7
	6H	15.8	16.0	16.3	16.6	17.1	13.2	13.5	13.7	14.0	14.5
	8H	15.7	15.9	16.2	16.4	16.9	13.1	13.4	13.7	13.9	14.4

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	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519
2.5	1462	1473	1481	1489	1496	1498	1503	1504	1503	1498	1492	1486	1477	1463	1454	1438	1421	1404	1381
5	1276	1294	1316	1312	1332	1336	1343	1351	1350	1347	1333	1316	1292	1271	1257	1225	1219	1174	1144
7.5	983	1018	1045	1053	1079	1087	1096	1097	1096	1091	1075	1055	1036	1011	991	956	943	915	881
10	697	716	732	772	786	802	812	805	814	798	794	765	754	729	704	684	643	627	610
12.5	466	484	508	532	552	535	541	549	545	539	528	514	492	470	461	436	416	398	393
15	292	297	325	338	353	369	373	369	361	358	334	322	307	297	280	265	256	234	232
17.5	177	191	196	207	220	232	229	230	228	223	213	201	187	185	172	162	157	154	145
20	111	116	121	131	141	141	143	146	138	129	127	125	118	111	110	104	100	98	96
22.5	77	79	82	85	89	92	93	91	90	87	85	81	79	75	72	70	69	67	67
25	57	59	61	62	65	66	66	66	65	62	61	58	55	54	53	50	50	49	49
27.5	44	46	47	48	49	50	51	51	49	47	46	44	42	41	39	38	38	37	37
30	35	37	38	38	39	40	41	41	40	38	37	35	34	32	30	29	29	29	29
32.5	29	31	32	32	32	33	34	34	33	31	30	29	27	27	25	24	24	24	24
35	26	27	28	28	28	28	29	29	28	27	26	24	23	23	22	22	21	22	22
37.5	24	24	25	25	25	25	25	25	24	24	23	22	21	21	20	20	20	21	20
40	22	23	23	23	23	23	23	23	23	22	22	20	20	19	19	19	20	20	19
42.5	21	21	22	22	22	22	22	21	21	21	21	20	19	19	19	19	19	19	19
45	20	21	21	21	21	21	21	20	20	20	20	19	18	18	18	18	18	18	18
47.5	19	19	20	20	20	20	20	20	19	19	19	18	18	17	17	17	17	17	17
50	17	18	18	18	19	19	19	18	18	18	18	17	17	16	16	16	16	15	15
52.5	15	16	16	17	17	17	17	17	17	17	16	16	15	15	15	14	14	14	13
55	12	13	14	14	15	15	15	15	15	15	15	14	14	13	13	12	12	12	11
57.5	9	10	11	12	12	12	13	13	13	13	13	12	11	11	10	10	10	9	8
60	6	7	8	9	9	10	10	10	11	11	10	10	9	9	8	8	7	6	6
62.5	4	5	5	6	7	7	8	8	8	8	8	7	7	6	6	5	4	4	3
65	2	2	3	4	5	5	5	5	6	6	5	5	4	4	3	3	2	2	1
67.5	0	1	1	2	2	3	3	4	4	4	3	3	2	2	1	1	0	0	0
70	0	0	0	1	1	1	1	2	2	2	2	1	1	0	0	0	0	0	0
72.5	0	0	0	0	0	0	1	1	1	1	1	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

77.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87.5	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

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	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519	1519
2.5	1364	1352	1343	1336	1343	1332	1330	1332	1339	1345	1356	1372	1400	1409	1427	1441	1454
5	1120	1104	1080	1077	1065	1059	1064	1082	1111	1117	1130	1143	1168	1192	1210	1237	1263
7.5	883	858	836	824	806	812	801	805	819	819	829	854	865	895	920	949	982
10	596	580	551	542	533	531	526	528	539	538	548	567	579	599	618	657	680
12.5	375	354	342	327	321	308	313	319	318	328	331	334	356	368	389	410	439
15	224	215	200	198	190	187	184	183	181	185	189	194	205	220	230	255	275
17.5	137	131	127	124	121	116	114	113	113	114	115	120	126	133	141	151	162
20	93	89	85	80	77	77	76	75	74	75	77	78	80	85	92	98	106
22.5	64	61	58	56	54	53	53	52	52	53	54	55	57	60	63	67	72
25	46	44	42	41	40	40	40	40	39	40	40	41	43	45	47	49	53
27.5	35	33	32	32	32	32	32	32	31	31	32	34	35	36	37	39	41
30	28	28	27	26	26	27	27	27	26	26	28	29	30	31	31	32	33
32.5	24	24	23	23	24	24	24	24	24	24	25	26	26	27	27	28	29
35	22	22	22	22	22	22	22	23	22	22	23	23	24	24	25	25	26
37.5	20	21	21	21	21	21	21	21	21	21	22	22	22	22	23	23	24
40	20	20	20	20	20	20	20	20	20	20	21	21	21	21	22	22	22
42.5	19	19	19	19	18	18	19	19	19	19	20	20	20	20	20	20	21
45	18	18	17	17	17	17	17	18	18	18	18	18	19	19	19	19	20
47.5	16	16	16	15	15	15	15	16	16	16	16	17	17	17	17	18	18

50	15	14	14	13	13	13	13	13	13	13	13	14	14	14	15	15	16	17
52.5	13	12	11	11	10	10	10	10	10	10	10	11	11	11	12	12	13	14
55	10	9	8	8	7	7	7	7	7	7	7	8	8	8	9	9	10	11
57.5	7	6	6	5	4	4	3	3	4	4	4	4	4	5	5	6	7	8
60	5	4	3	2	2	1	1	1	1	1	1	2	2	2	3	3	4	5
62.5	2	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	2	3
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
67.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72.5	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
77.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87.5	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

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

Zone	Lumens	% Total
0-5	32	13.20%
05-10	64.9	26.70%
10-15	50.8	20.90%
15-20	27.9	11.50%
20-25	15.2	6.30%
25-30	10.2	4.20%
30-35	8.1	3.30%
35-40	7.5	3.10%
40-45	7.4	3.00%
45-50	7	2.90%
50-55	5.9	2.40%
55-60	3.8	1.60%
60-65	1.8	0.70%
65-70	0.6	0.20%
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	1.15	1.12	1.1	1.08	1.12	1.1	1.08	0.96	1.06	1.05	1.03	1.02	1.01	1	0.99	0.98	0.97	0.96
2	1.1	1.06	1.03	1	1.08	1.04	1.01	0.92	1.01	0.99	0.97	0.98	0.96	0.95	0.96	0.94	0.93	0.91
3	1.06	1.01	0.97	0.94	1.04	1	0.96	0.88	0.97	0.94	0.91	0.95	0.92	0.9	0.93	0.9	0.89	0.87
4	1.02	0.96	0.92	0.88	1.01	0.95	0.91	0.85	0.93	0.9	0.87	0.91	0.88	0.86	0.89	0.87	0.85	0.84
5	0.99	0.92	0.88	0.84	0.97	0.91	0.87	0.81	0.9	0.86	0.83	0.88	0.85	0.82	0.87	0.84	0.82	0.81
6	0.96	0.89	0.84	0.81	0.94	0.88	0.84	0.79	0.87	0.83	0.8	0.85	0.82	0.79	0.84	0.81	0.79	0.78
7	0.93	0.86	0.81	0.78	0.91	0.85	0.81	0.76	0.84	0.8	0.77	0.83	0.79	0.77	0.82	0.79	0.76	0.75
8	0.9	0.83	0.78	0.75	0.89	0.82	0.78	0.74	0.81	0.77	0.75	0.8	0.77	0.74	0.79	0.76	0.74	0.73
9	0.87	0.8	0.76	0.73	0.87	0.8	0.76	0.72	0.79	0.75	0.72	0.78	0.75	0.72	0.77	0.74	0.72	0.71
10	0.85	0.78	0.74	0.71	0.84	0.78	0.73	0.7	0.77	0.73	0.7	0.76	0.73	0.7	0.76	0.72	0.7	0.69

Table 4. Utilisation Factor Table

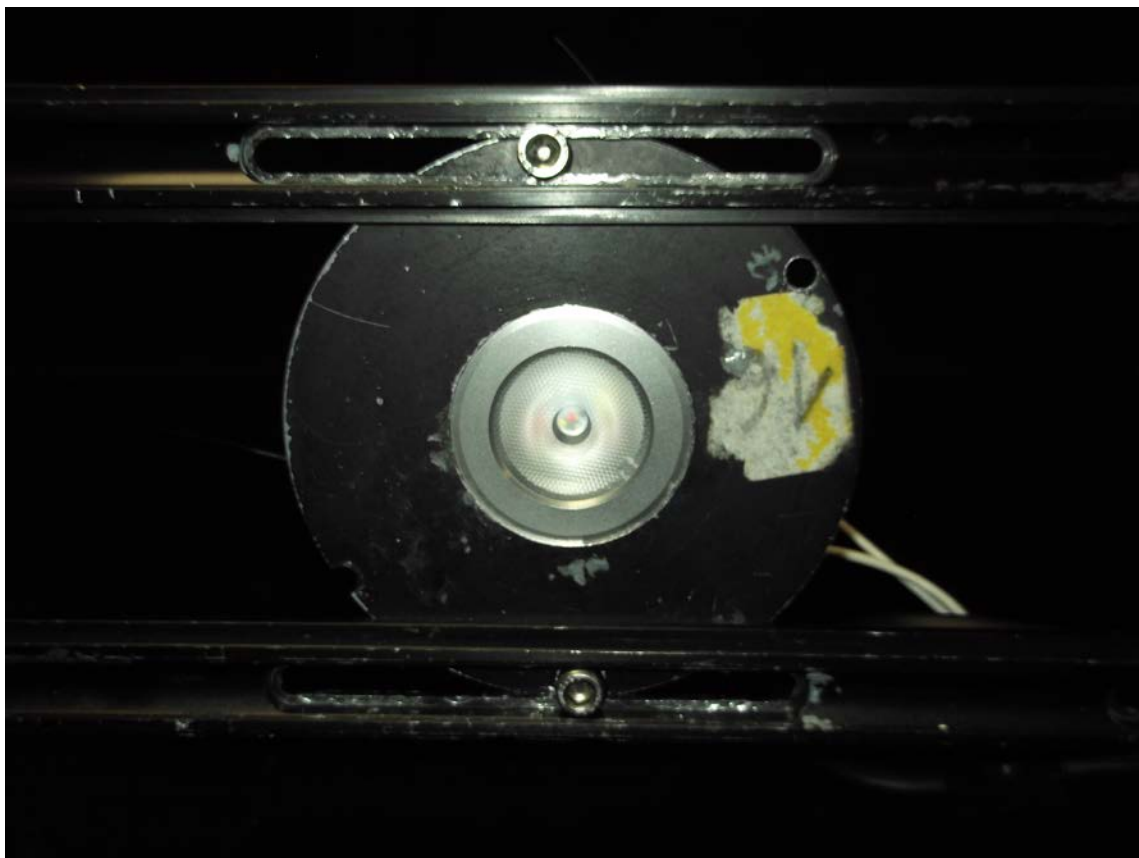


Photo 1: Luminaire on goniometer mount

Signature:

Print Name:

D CHAMBERS

Date:

16/01/2018

Technical Manager

Duly authorised to sign on behalf of:

Photometric and Optical Testing Services LLP