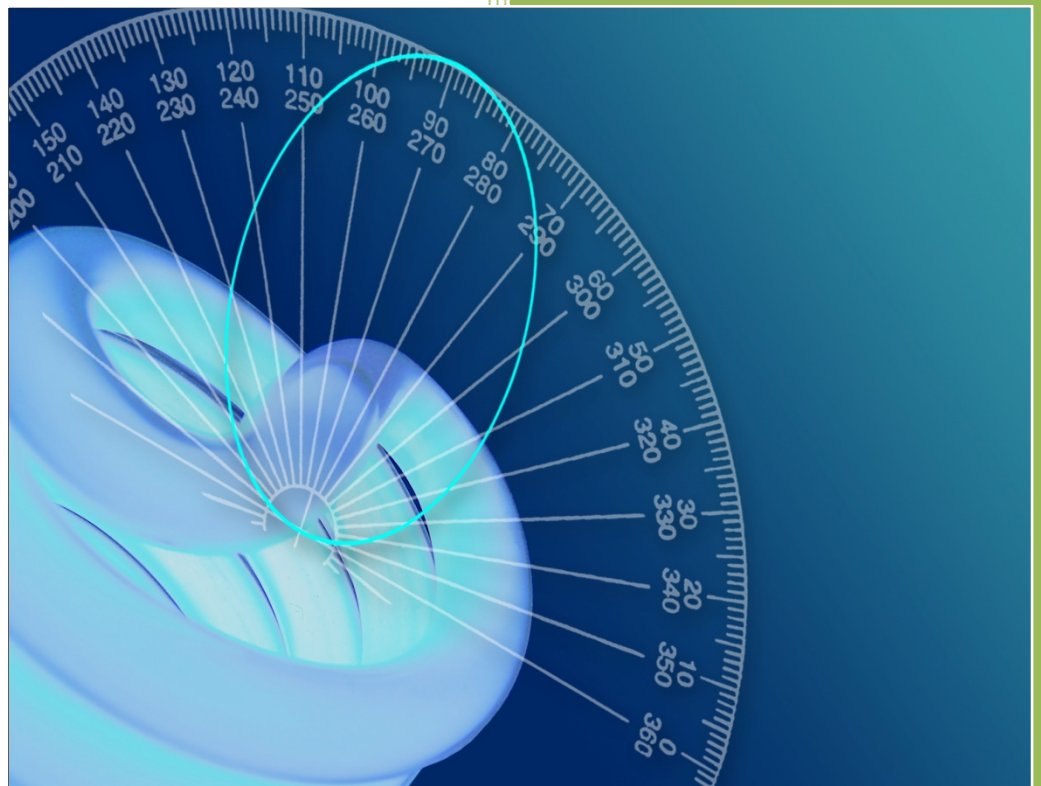


Photometric Test Report



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/DC14075	Report Date: 14/03/2014	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: SH LIGHTING	Email: b.gregory@signalhouse.co.uk
Address: Cherrycourt Way, Stanbridge Road, Leighton Buzzard, Bedfordshire, LU7 4UH	

Details of Product Tested

Manufacturer: SH LIGHTING	Source Type: LED
Model: 2FT BATTEN	Luminaire Type: DOWNLIGHT
Power Supply Used: Uninterruptible AC power supply	
Voltage(AC V) = 230.0	Current (mA)= 73
Power (Watts)= 15.64	Power factor= 0.932

Integrating Sphere Test

Date of Test: 24/02/2014	Ambient Temperature: 25°C
Measurement Filename: 2FT BATTEN	
Instrument Used: Labsphere model CSLMS HALOGEN 4060 integrating sphere spectroradiometer	
Integrating Sphere Size: 1m	Measurement Geometry ($2\pi / 4\pi$): 4π
Sample Orientation: Horizontal	Auxiliary Correction Applied: YES
Comments:	
Date of Last Calibration (Operating Hours): 08-11-2012 (02:36)	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): 1319	
CIE 1931 Chromaticity Cx: 0.3193	CIE 1931 Chromaticity Cy: 0.3295
CRI (%): 75.09	CCT (K): 6149

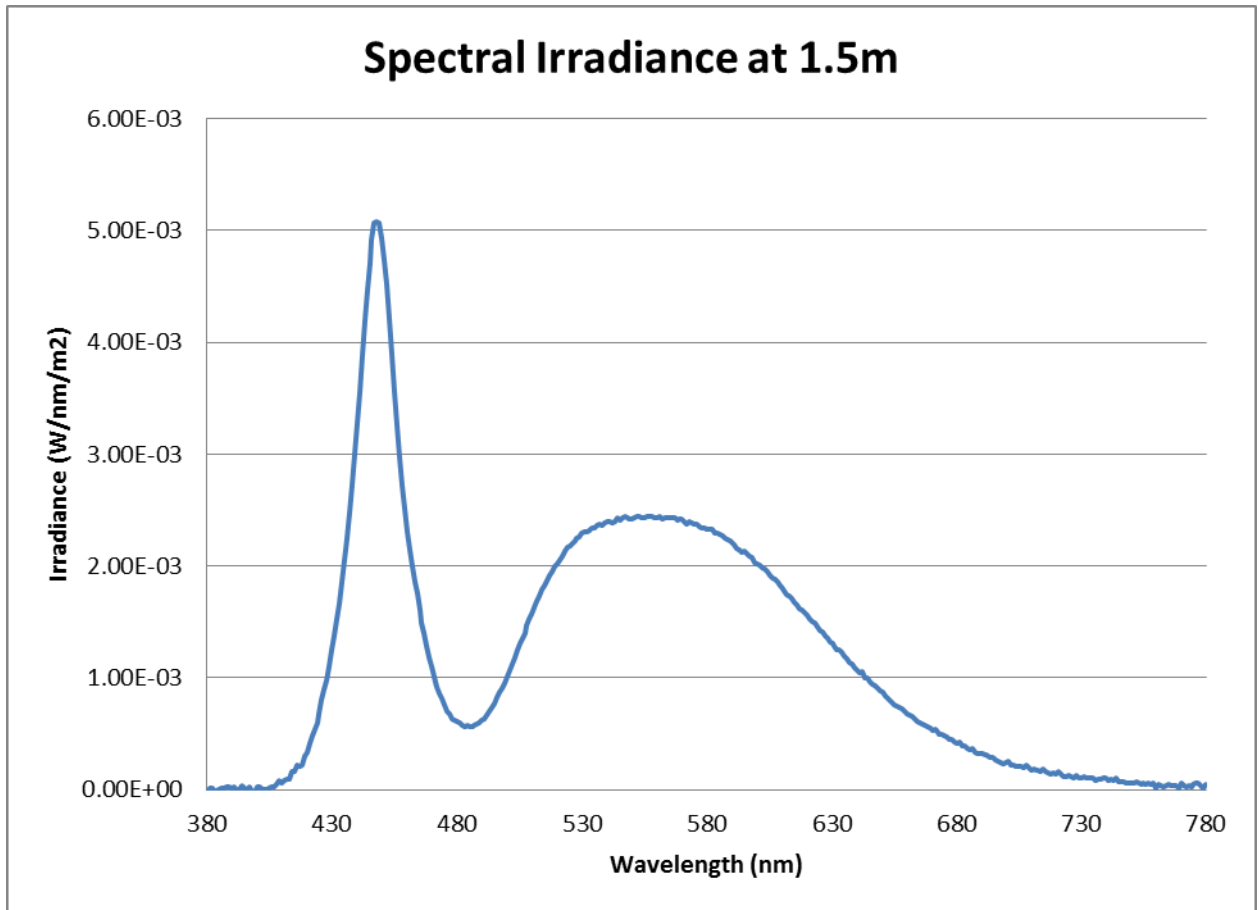


Figure 1: Spectral Irradiance

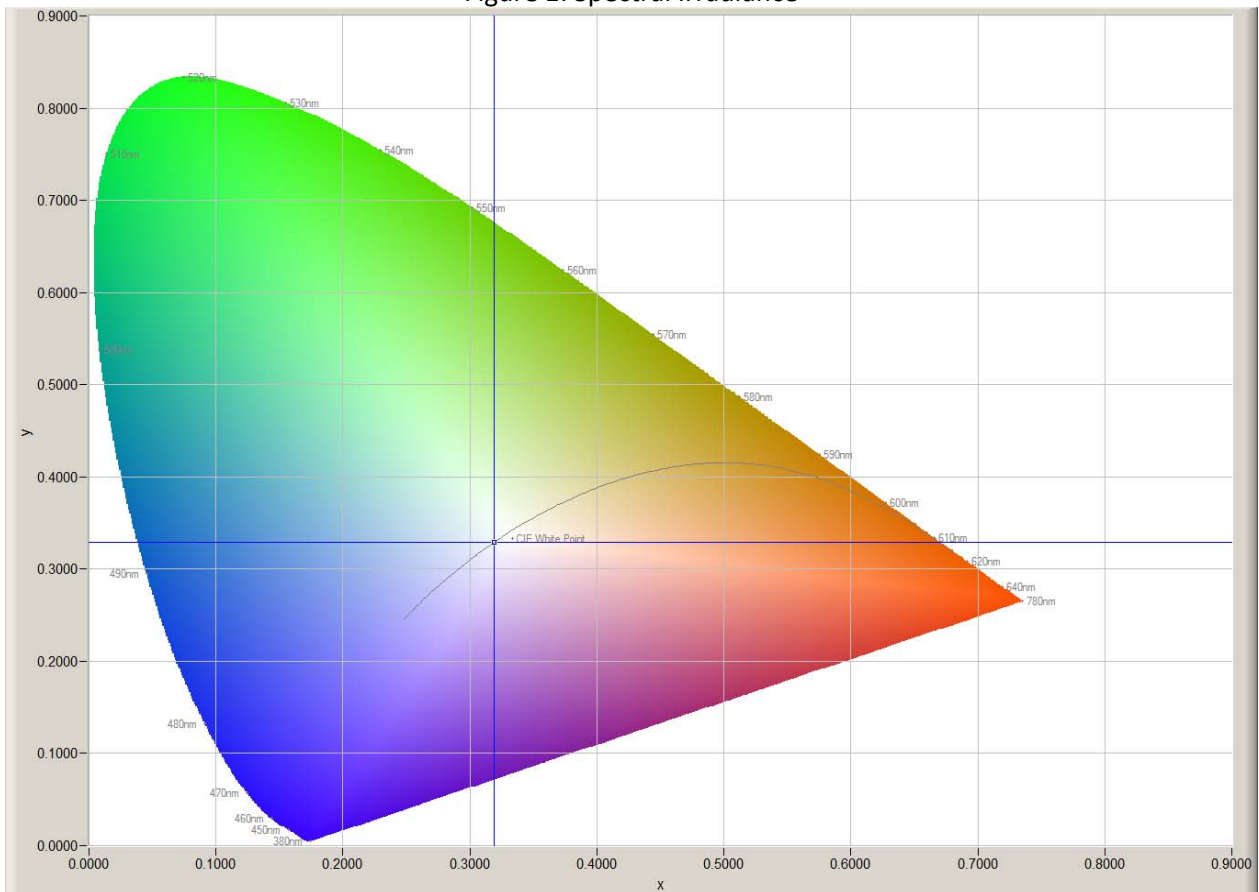


Figure 2: CIE 1931 diagram.

Goniophotometer Test		
Date of Test: 12/03/2014	Ambient Temperature: 25°C	
Measurement Filename: 2FT BATTEN		
Instrument Used: Radiant Imaging NFMS0800 Goniometer with ProMetric PM-1200N-1 Imaging Photometer		
Photometer Working Distance: 1.5m	Measurement Geometry: Near-Field	
Comments:		
Reference Photometer Used: Specbos1201	Reference Photometer Serial Number: 2911670	
Traceable: to NPL standards, UKAS Accredited	Calibration Certificate Number: 13201	
Calibration Certificate Date: 15 th March 2013	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):1319	Peak Intensity (3° Spot, candelas):389	Efficacy (lumens/Watt): 84.3
Beam Angle (50% of max intensity C0-180, degrees): 99.9		
Photometric Filename (IES LM-63-2002): 2FT BATTEN		
IES File – Absolute or Relative Format? ABSOLUTE		
Photometric Filename (EULUMDAT): 2FT BATTEN		
EULUMDAT File – Absolute or Relative Format? ABSOLUTE		

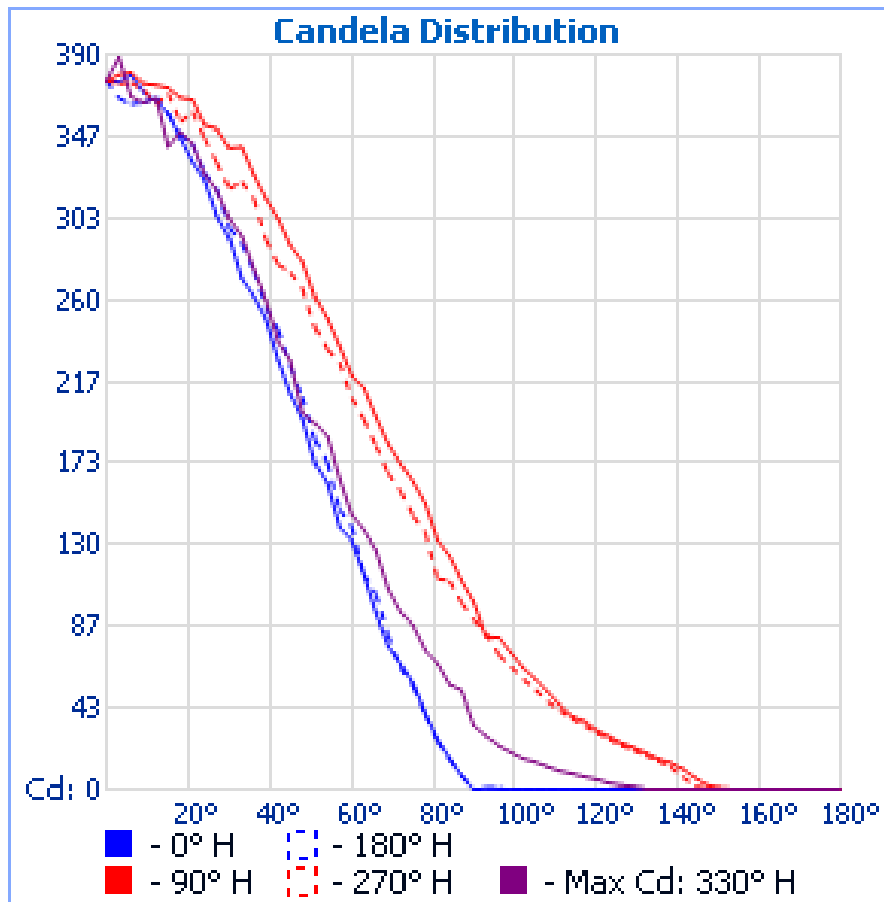


Figure 3: Far-Field Luminous Intensity (C0-180, Cartesian Coordinates)

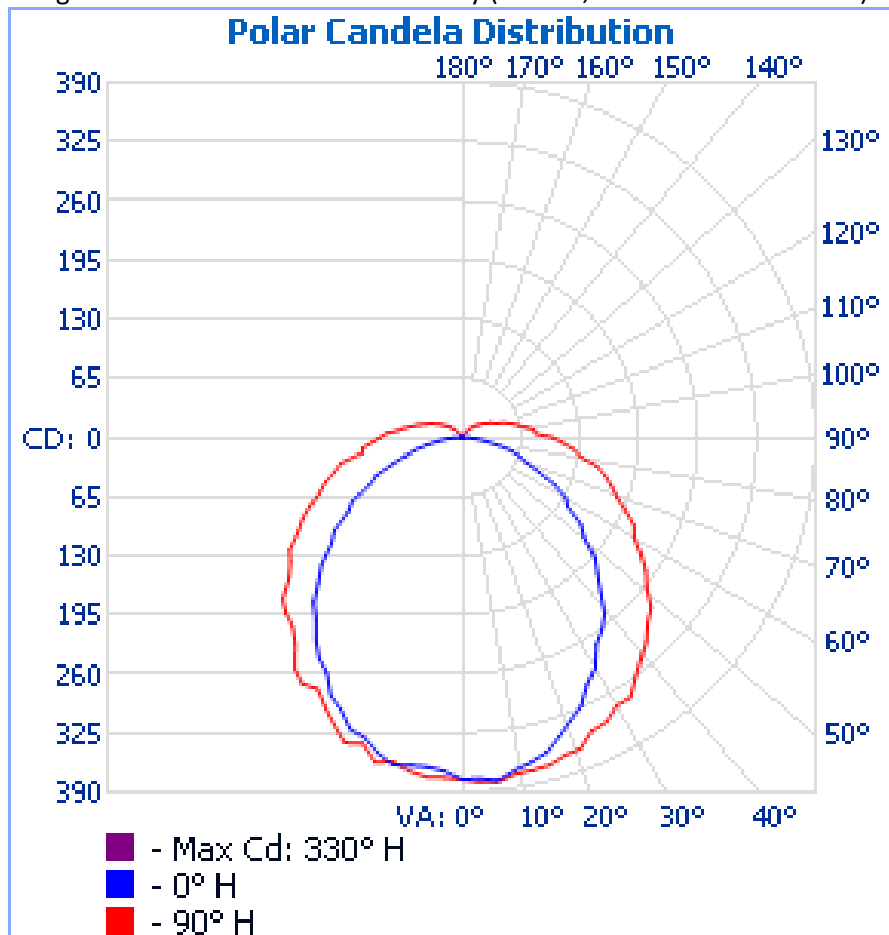


Figure 4: Far-Field Luminous Intensity (C0-180, C90-270, Polar Coordinates)

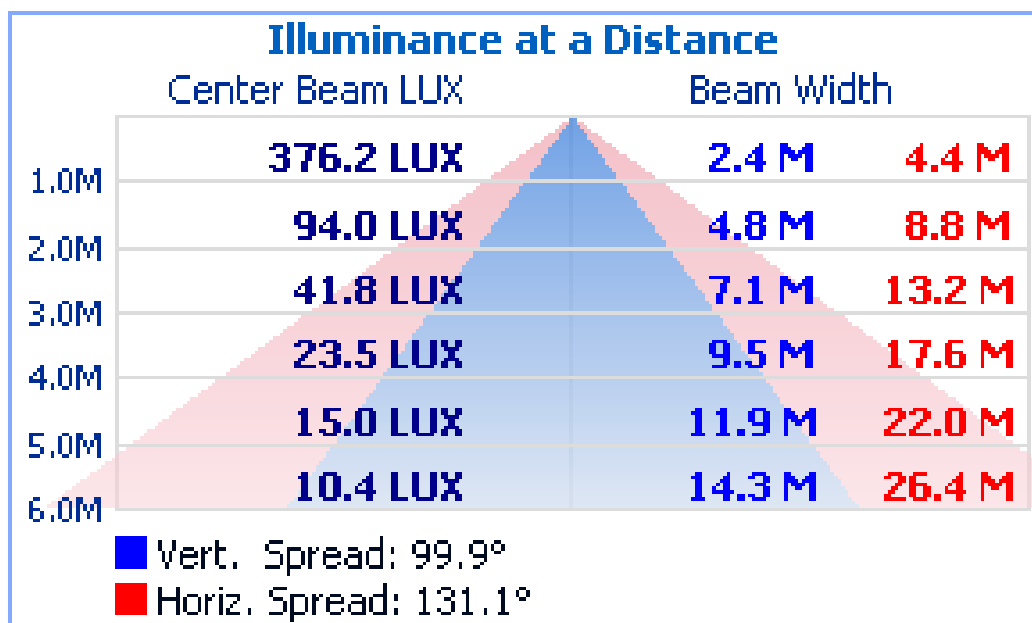


Figure 4. Cone diagram for mounting height of 6 metres.

Room dimension		Viewed crosswise					Viewed endwise				
x	y										
2H	2H	16.5	18.0	17.0	18.5	19.0	20.8	22.3	21.3	22.8	23.3
	3H	17.3	18.7	17.8	19.2	19.8	23.0	24.4	23.5	24.9	25.4
	4H	17.6	18.9	18.1	19.4	20.0	24.1	25.4	24.6	26.0	26.5
	6H	17.7	19.0	18.3	19.5	20.1	25.3	26.6	25.9	27.1	27.7
	8H	17.7	18.9	18.2	19.4	20.0	25.9	27.0	26.4	27.6	28.2
	12H	17.7	18.8	18.2	19.4	20.0	26.5	27.6	27.0	28.2	28.8
4H	2H	17.6	18.9	18.1	19.5	20.0	21.0	22.3	21.5	22.8	23.4
	3H	18.6	19.8	19.2	20.3	20.9	23.3	24.5	23.8	25.0	25.6
	4H	19.1	20.1	19.6	20.7	21.3	24.6	25.6	25.2	26.2	26.8
	6H	19.3	20.2	19.8	20.8	21.4	25.9	26.9	26.5	27.4	28.1
	8H	19.3	20.2	19.9	20.8	21.4	26.6	27.5	27.2	28.1	28.7
	12H	19.3	20.1	19.9	20.7	21.4	27.4	28.2	28.0	28.8	29.4
8H	4H	19.8	20.7	20.4	21.3	21.9	24.7	25.5	25.3	26.1	26.8
	6H	20.2	20.9	20.8	21.5	22.2	26.1	26.8	26.7	27.4	28.1
	8H	20.4	21.0	21.0	21.6	22.3	26.9	27.6	27.5	28.2	28.9
	12H	20.4	21.0	21.0	21.6	22.3	27.8	28.4	28.4	29.0	29.7
12H	4H	20.0	20.8	20.6	21.4	22.1	24.7	25.5	25.3	26.1	26.7
	6H	20.6	21.2	21.2	21.8	22.5	26.2	26.8	26.8	27.4	28.1
	8H	20.8	21.3	21.4	22.0	22.7	26.9	27.5	27.6	28.2	28.8

Table 1. UGR values

	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376
3	375	375	377	381	382	383	383	382	380	379	379	378	378	380	383	383	378	372	367
6	379	371	366	370	375	377	373	368	374	381	379	381	377	370	369	377	386	377	364
9	370	357	369	378	366	373	385	377	379	375	374	380	377	382	380	367	368	384	364
12	365	352	368	357	365	372	378	372	377	374	377	376	374	362	369	373	358	362	367
15	359	359	359	358	365	364	369	370	364	372	371	374	370	362	358	370	351	356	359
18	346	345	352	354	352	373	361	366	369	367	367	372	362	370	351	362	346	353	347
21	333	341	335	334	353	347	355	361	359	366	357	362	359	358	349	342	344	340	343
24	323	322	324	339	333	346	341	359	358	352	354	352	355	337	344	322	342	321	327
27	304	317	314	323	335	326	340	344	349	351	345	350	342	331	329	303	325	307	319
30	293	304	303	305	315	333	321	339	343	340	343	331	331	320	316	306	305	286	298
33	271	286	291	293	304	312	327	316	330	341	334	323	322	317	298	296	298	274	290
36	262	277	269	280	292	297	318	315	314	326	321	318	310	298	281	288	281	255	275
39	250	253	258	262	279	288	289	307	315	313	303	308	300	275	275	275	258	244	256
42	228	240	237	251	259	278	289	291	300	303	298	297	290	273	258	257	238	224	244
45	210	217	227	236	246	265	275	273	284	289	283	283	274	259	256	245	219	212	224
48	197	197	214	223	236	238	259	276	278	280	280	275	259	249	236	216	207	191	209
51	173	181	191	203	227	227	243	261	265	261	267	265	245	233	229	208	182	179	185
54	162	164	181	180	200	218	229	240	246	250	247	241	229	222	203	185	172	164	173
57	139	151	165	174	187	208	213	230	238	235	239	225	219	205	190	170	151	144	149
60	132	130	143	159	178	195	203	220	225	220	223	212	203	187	175	155	137	127	139
63	114	115	129	143	154	179	196	197	207	213	204	194	185	166	158	139	121	116	114
66	94	95	114	130	144	164	180	190	190	198	193	188	179	161	149	123	105	102	104
69	76	85	97	116	135	149	161	172	183	183	179	174	162	146	127	109	95	88	82
72	67	69	90	106	124	132	144	159	171	173	164	167	148	136	116	95	81	72	65
75	56	55	73	90	105	122	136	146	156	163	157	155	134	124	105	88	66	57	54
78	41	42	60	76	92	114	127	142	139	152	143	136	130	115	93	75	59	45	39
81	27	32	50	65	87	105	119	128	133	132	132	126	115	106	86	66	48	33	26
84	17	23	38	56	73	94	104	113	123	124	123	113	108	86	68	57	38	24	16
87	7	17	33	44	65	81	88	104	111	111	106	100	98	81	66	44	34	17	7
90	0	10	26	43	63	74	84	90	96	99	98	93	85	70	63	42	24	11	0
93	1	9	25	35	53	67	73	77	79	81	77	83	72	55	49	31	19	6	1

96	0	6	18	28	41	55	69	75	77	81	80	76	63	51	40	25	13	3	1
99	0	4	12	23	35	48	62	67	69	73	73	66	57	45	32	20	9	1	0
102	0	2	10	19	29	42	55	60	62	64	64	58	50	40	26	16	7	1	0
105	0	1	8	16	26	37	48	53	57	59	57	52	45	34	23	13	7	1	0
108	0	1	7	15	23	32	41	45	48	52	49	45	39	30	19	12	6	1	0
111	0	1	7	14	20	28	36	40	44	45	44	39	33	26	17	11	6	1	0
114	0	0	5	11	17	25	31	36	39	39	39	35	29	22	15	9	4	0	0
117	0	0	3	9	15	22	28	33	35	36	36	31	26	20	13	7	2	0	0
120	0	0	2	8	13	20	24	28	31	31	30	28	23	18	12	5	1	0	0
123	0	0	1	7	11	17	21	26	27	28	27	24	20	16	9	4	1	0	0
126	0	0	1	5	9	14	18	22	25	25	23	21	18	14	7	3	1	0	0
129	0	0	0	3	7	12	16	19	21	22	21	18	16	11	5	1	1	0	0
132	0	0	0	1	6	10	15	17	19	20	19	16	14	9	3	1	0	0	0
135	0	0	0	1	3	8	12	15	16	16	17	15	11	6	2	1	0	0	0
138	0	0	0	0	2	6	9	12	14	14	14	11	7	3	1	0	0	0	0
141	0	0	0	0	0	3	6	8	11	11	10	7	4	2	1	0	0	0	0
144	0	0	0	0	0	2	2	5	6	6	5	3	2	1	0	0	0	0	0
147	0	0	0	0	0	0	1	1	2	2	1	0	1	1	0	0	0	0	0
150	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
168	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
174	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180	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	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376	376
3	366	370	374	376	378	378	377	376	374	373	372	375	381	387	389	384	379
6	368	378	373	370	371	372	371	374	375	371	373	377	379	375	368	371	380
9	359	374	369	364	373	381	381	371	371	371	367	368	364	364	364	352	373
12	362	372	354	363	368	362	363	369	363	367	364	357	363	369	367	355	367
15	354	363	353	353	355	351	363	365	369	363	360	352	356	357	341	364	345
18	348	354	340	358	343	357	354	363	354	346	350	359	342	342	349	342	337
21	340	337	341	339	343	345	343	354	359	347	355	335	353	335	343	334	341
24	328	325	336	325	339	333	336	340	346	355	332	333	327	330	326	331	321
27	325	309	326	317	328	331	344	331	333	331	329	321	332	307	318	311	306
30	307	287	310	308	307	321	314	337	319	324	317	313	304	319	303	296	287
33	290	274	293	294	293	309	300	317	322	320	305	308	298	283	294	284	276
36	277	260	273	290	283	295	300	305	313	295	306	285	293	290	276	270	265
39	262	247	259	275	282	278	297	291	292	299	290	291	267	262	260	252	250
42	243	231	240	265	270	270	278	280	279	284	275	267	264	258	238	241	230
45	229	222	222	239	256	264	270	271	274	262	268	259	242	241	228	208	222
48	209	204	208	221	237	249	247	259	266	257	255	250	245	218	200	198	213
51	199	195	190	211	230	234	236	252	245	246	236	231	221	207	194	183	185
54	177	179	174	198	209	227	226	232	234	237	231	216	200	194	187	168	166
57	162	159	158	182	196	213	219	220	226	225	217	200	191	182	165	151	144
60	138	149	154	159	177	191	209	206	208	206	207	196	175	163	146	138	137
63	121	132	137	144	163	179	189	195	196	193	190	179	162	146	138	127	124
66	110	116	125	134	143	162	174	181	182	176	176	164	149	141	127	111	108
69	87	105	111	125	139	146	159	160	168	167	162	146	138	124	106	92	80
72	79	83	95	114	124	134	150	159	158	151	141	145	126	118	94	80	76
75	56	72	88	104	115	128	132	145	145	140	136	129	113	101	87	73	57
78	43	59	77	89	108	115	126	130	136	134	124	116	99	91	74	59	45
81	33	52	70	82	89	105	113	126	112	117	114	103	92	79	67	51	34
84	27	40	60	73	81	95	101	110	111	109	103	95	82	71	56	40	25
87	18	32	49	63	74	86	94	99	99	98	93	86	75	61	52	32	16
90	12	24	39	51	57	70	90	85	90	88	86	74	64	55	34	26	12
93	9	21	32	43	58	68	74	82	83	81	72	67	54	42	28	18	6

96	6	17	26	38	49	59	63	70	71	68	62	56	46	35	23	14	3
99	3	14	22	33	43	51	56	64	65	62	56	49	41	30	20	11	2
102	1	11	19	28	38	45	52	57	59	57	50	45	36	26	16	8	1
105	1	8	16	23	34	42	47	51	53	50	44	39	32	22	14	6	1
108	1	7	15	21	30	36	41	46	47	47	40	35	28	19	12	4	2
111	1	6	13	19	27	33	37	41	42	40	37	31	25	17	10	3	2
114	1	3	11	17	24	29	33	37	38	35	32	27	22	15	8	1	1
117	0	1	9	14	21	26	30	33	34	32	30	24	19	13	7	0	1
120	0	0	8	12	19	24	27	30	30	29	26	22	16	11	5	0	0
123	0	0	8	11	16	21	24	26	27	26	23	19	14	9	3	1	0
126	0	0	4	9	14	19	22	23	23	23	20	17	13	7	2	0	0
129	0	0	1	6	12	16	18	20	21	20	18	15	10	5	2	0	0
132	0	0	0	4	10	13	16	17	18	17	15	12	7	2	0	0	0
135	0	0	0	1	7	10	13	15	15	15	13	8	5	1	0	0	0
138	0	0	0	0	5	6	10	11	12	11	8	5	2	1	0	0	0
141	0	0	0	0	1	3	5	6	7	6	5	3	1	0	0	0	0
144	0	0	0	0	0	0	1	1	2	2	1	1	0	0	0	0	0
147	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
168	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
174	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180	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°

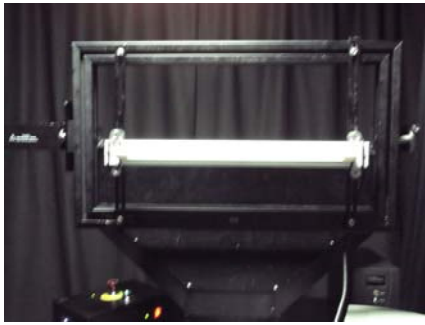


Photo 1: Luminaire on goniometer mount

Signature:

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

Print Name:

D CHAMBERS

Date:

14/03/2014

Test Engineer

Duly authorised to sign on behalf of:

Photometric and Optical Testing Services LLP