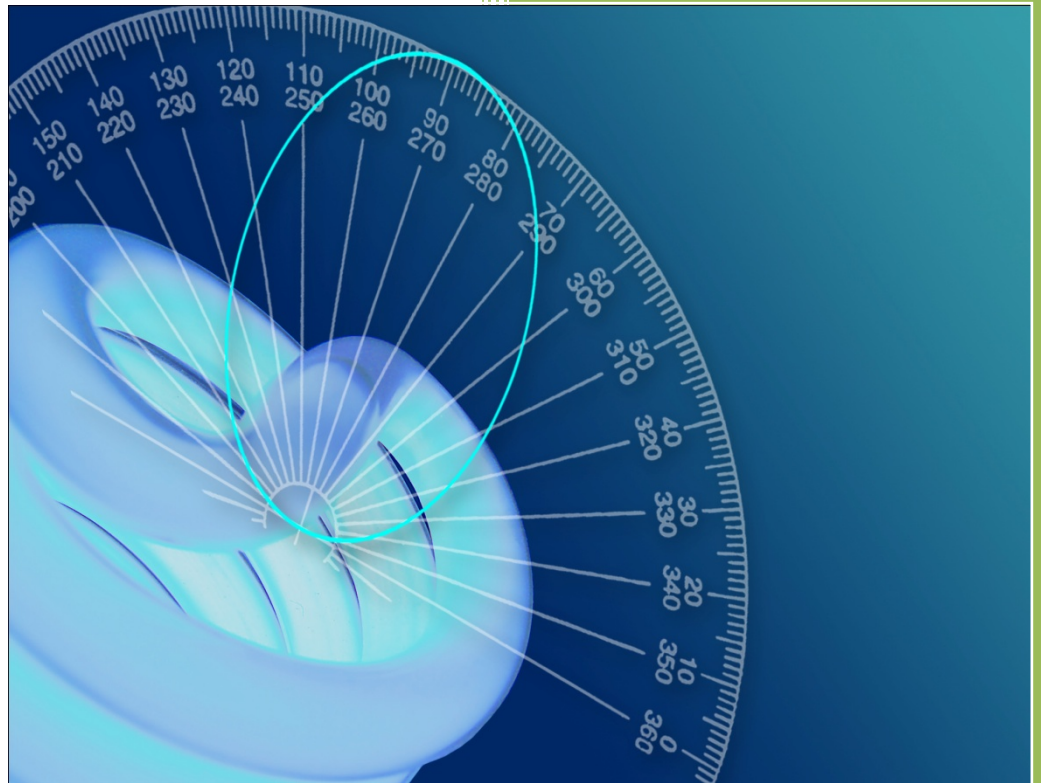


# Photometric Test Report



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/DC15116	Report Date: 16/07/2015	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: Far Eastern Manufacturing Ltd	Email: <a href="mailto:morris@traypoint.com">morris@traypoint.com</a> / <a href="mailto:octavian@traypoint.com">octavian@traypoint.com</a>
Address: Major House, Unit B, 964 North Circular Road, London, NW2 7JR	

### 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: Far Eastern Manufacturing Ltd	Source Type: LED
Model: 13W LED WALL LIGHT	Luminaire Type: WALL LIGHT
Power Supply Used: Kikusui PCR1000M Voltage Stabiliser S/N SM01191	
Voltage(AC V) = 230.0	Current (mA)= 56
Power (Watts)= 11.3	Power factor= 0.871

### Integrating Sphere Test

Date of Test: 15/07/2015	Ambient Temperature: 25°C
Measurement Filename: 13W LED WALL LIGHT	
Instrument Used: Labsphere model CSLMS HALOGEN 4060 integrating sphere spectroradiometer	
Integrating Sphere Size: 1m	Measurement Geometry ( $2\pi / 4\pi$ ): $4\pi$
Sample Orientation: Horizontal	Auxiliary Correction Applied: YES
Comments:	
Date of Last Calibration (Operating Hours): 06-07-2015 (04:06)	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 <sup>th</sup> February 2010
Calibration Lamp Uncertainty: $\pm 0.67\%$ ( $k=2$ )	
<b>Results</b>	
Flux (lumens): 1151	
CIE 1931 Chromaticity Cx: 0.4509	CIE 1931 Chromaticity Cy: 0.4258
CRI (%): 60.48	CCT (K): 2945

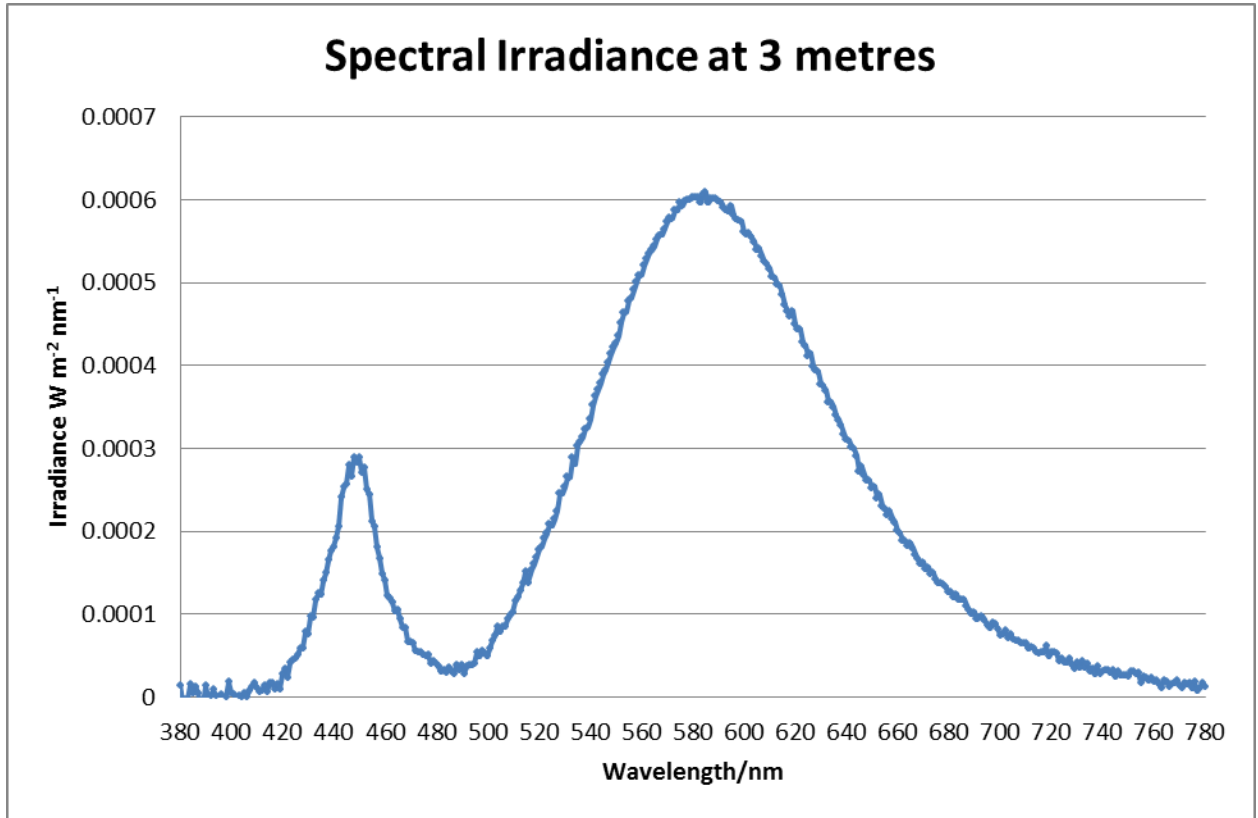


Figure 1: Spectral Irradiance

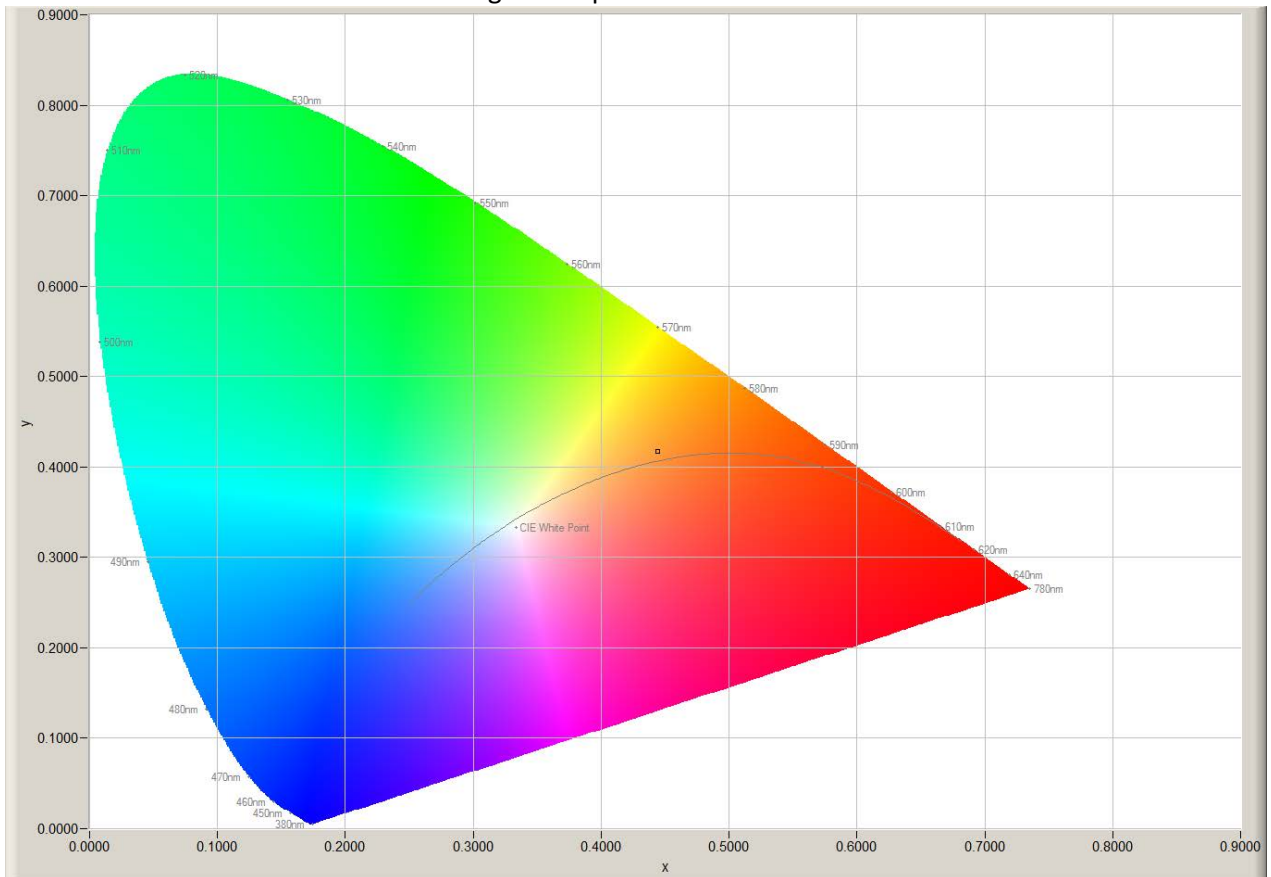


Figure 2: CIE 1931 diagram.

Goniophotometer Test		
Date of Test: 15/07/2015	Ambient Temperature: 25°C	
Measurement Filename: 13W LED WALL LIGHT		
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 Number: 2129 WK-L 2014-02	
Calibration Certificate Date: 13 February 2014	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	0-180°	3°
Azimuth	0-360°	10°
Results		
Integrated Luminous Flux (lumens):1151	Peak Intensity (3° Spot, candelas): 240.2	Efficacy (lumens/Watt): 102
Beam Angle (50% of max intensity C0-180, degrees): 90		
Photometric Filename (IES LM-63-2002): 13W LED WALL LIGHT		
IES File – Absolute or Relative Format? ABSOLUTE		
Photometric Filename (EULUMDAT): 13W LED WALL LIGHT		
EULUMDAT File – Absolute or Relative Format? ABSOLUTE		

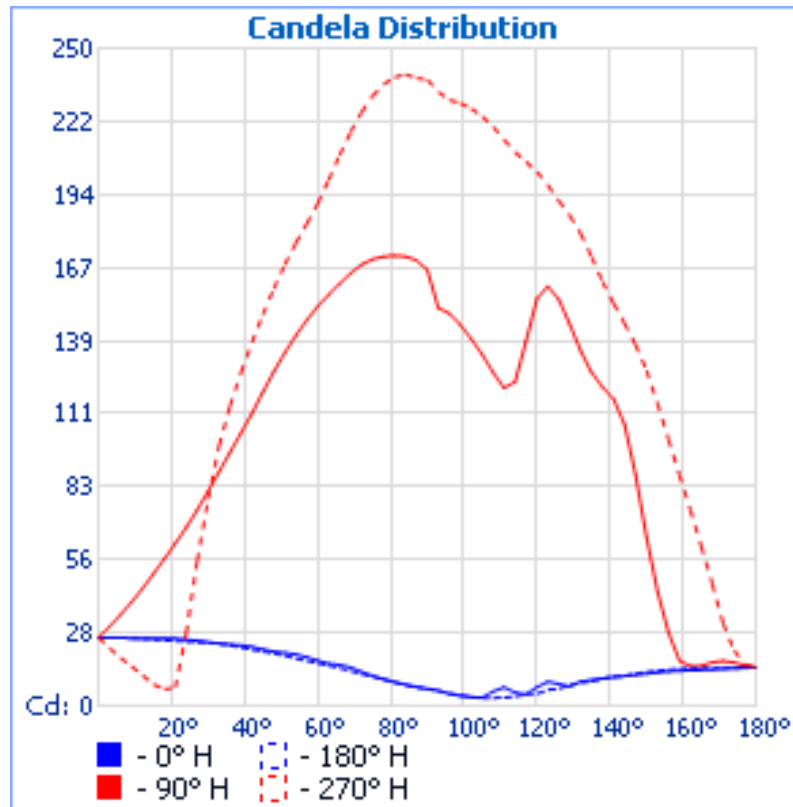


Figure 3: Far-Field Luminous Intensity (C0-180, Cartesian Coordinates)

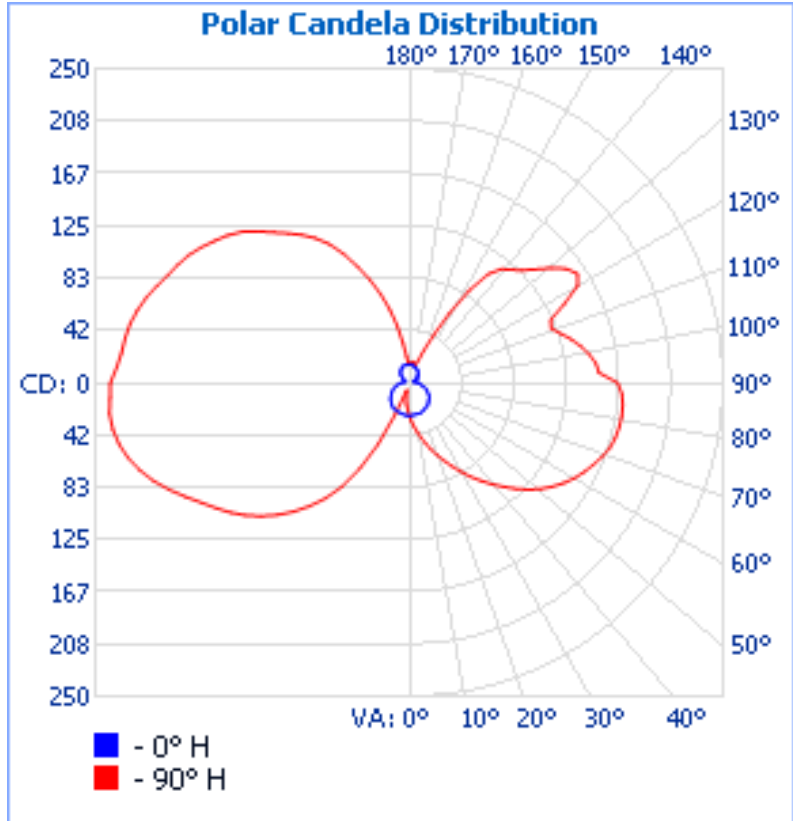


Figure 4: Far-Field Luminous Intensity (C0-180, C90-270, Polar Coordinates)

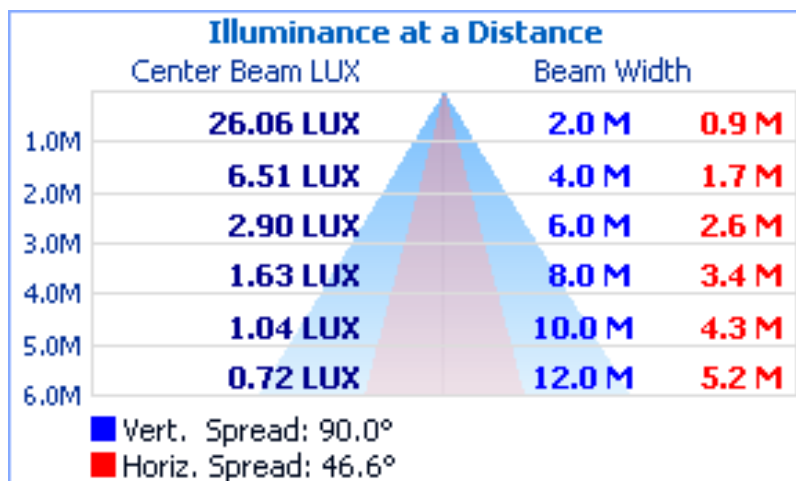


Figure 5. Cone diagram for mounting height of 6 metres.

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	<10.0	<10.0	<10.0	<10.0	<10.0	16.0	17.0	16.9	18.0	19.2
2H	2H	<10.0	<10.0	<10.0	<10.0	<10.0	16.0	17.0	16.9	18.0	19.2
	3H	<10.0	<10.0	<10.0	<10.0	<10.0	19.9	20.9	20.8	21.8	23.1
	4H	<10.0	<10.0	<10.0	<10.0	10.3	21.9	22.9	22.8	23.8	25.1
	6H	<10.0	<10.0	<10.0	<10.0	10.5	24.0	24.9	24.9	25.8	27.1
	8H	<10.0	<10.0	<10.0	<10.0	10.6	24.9	25.8	25.9	26.8	28.1
12H	<10.0	<10.0	<10.0	<10.0	10.6	25.9	26.8	26.9	27.8	29.0	
4H	2H	10.2	11.2	11.2	12.2	13.4	16.4	17.3	17.3	18.3	19.6
	3H	11.9	12.7	12.8	13.7	15.0	20.5	21.4	21.4	22.3	23.6
	4H	12.6	13.4	13.6	14.4	15.7	22.8	23.6	23.7	24.5	25.8
	6H	13.0	13.8	14.0	14.8	16.0	25.0	25.7	25.9	26.7	28.0
	8H	13.1	13.8	14.1	14.8	16.1	26.1	26.8	27.1	27.8	29.1
12H	13.2	13.8	14.1	14.8	16.1	27.3	27.9	28.2	28.9	30.2	
8H	4H	15.5	16.2	16.5	17.2	18.5	23.0	23.7	23.9	24.7	25.9
	6H	16.5	17.1	17.4	18.1	19.4	25.4	26.0	26.4	27.0	28.3
	8H	16.9	17.4	17.8	18.4	19.7	26.8	27.3	27.7	28.3	29.6
	12H	17.0	17.5	18.0	18.5	19.8	28.1	28.6	29.1	29.6	30.9
12H	4H	16.4	17.0	17.3	18.0	19.3	23.0	23.6	24.0	24.6	25.9
	6H	17.6	18.2	18.6	19.2	20.5	25.5	26.0	26.5	27.1	28.4
	8H	18.2	18.6	19.2	19.7	21.0	26.9	27.3	27.9	28.4	29.7

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	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
3	26	27	27	28	29	29	30	30	30	30	30	30	30	29	29	28	27	27	26	26
6	26	27	29	30	31	32	33	34	35	35	35	34	33	32	31	30	29	27	26	26
9	26	28	30	32	34	36	38	39	39	39	39	39	37	36	34	32	30	28	26	26
12	26	29	31	34	37	40	42	44	44	45	44	44	42	40	37	34	32	29	25	25
15	26	29	33	37	40	44	46	48	50	50	50	48	46	44	40	37	33	29	25	25
18	26	30	34	39	43	48	51	54	55	56	55	53	51	47	43	39	34	29	25	25
21	26	30	35	41	47	52	56	59	61	62	61	58	55	52	46	41	35	30	25	25
24	25	31	37	43	50	56	61	65	67	68	67	65	61	56	50	43	37	30	24	24
27	25	31	38	45	53	59	66	71	74	75	74	71	66	60	53	46	38	31	24	24
30	24	31	39	47	56	64	71	76	80	82	81	77	71	65	57	48	40	32	24	24
33	24	31	40	49	59	68	77	83	87	89	87	83	77	69	60	50	41	32	24	24
36	23	32	42	52	63	73	82	90	94	96	94	90	82	74	63	52	42	32	23	23
39	23	32	43	55	67	78	88	96	102	104	102	96	88	78	66	54	42	32	22	22
42	23	32	44	57	70	83	94	103	110	111	109	103	93	82	69	56	43	31	21	21
45	22	32	45	59	73	87	100	110	117	119	117	110	99	86	72	58	44	31	21	21
48	21	32	46	60	76	91	105	117	124	127	123	116	104	91	75	59	45	31	20	20
51	20	32	47	62	79	95	111	124	130	134	130	123	110	95	78	60	46	31	19	19
54	20	32	47	63	81	99	116	129	136	141	138	128	115	98	80	62	46	31	18	18
57	19	31	47	65	83	102	120	134	143	147	144	133	119	101	82	64	46	30	17	17
60	17	30	47	65	85	106	124	139	149	152	148	139	123	105	85	65	46	30	16	16
63	16	30	47	66	86	108	128	143	154	156	152	143	126	108	88	66	46	29	15	15
66	16	29	47	66	88	110	131	147	158	161	157	147	130	110	89	67	47	29	14	14
69	15	28	46	66	89	112	133	150	161	165	161	151	133	113	90	67	46	28	13	13
72	13	27	46	66	90	114	136	153	164	168	165	153	135	113	91	67	46	27	12	12
75	12	26	45	66	90	116	137	155	166	170	167	155	137	115	91	67	45	26	11	11
78	10	24	43	66	91	116	136	155	166	171	167	155	136	115	91	65	43	24	10	10
81	9	23	42	65	90	114	136	154	166	171	167	153	134	113	88	64	41	22	9	9
84	8	21	41	65	89	113	137	155	166	171	167	155	135	113	87	64	40	21	8	8
87	7	20	40	63	88	112	137	154	165	169	164	153	133	111	86	62	39	20	7	7
90	7	19	38	60	82	105	130	148	161	166	159	146	126	103	81	58	36	19	7	7
93	6	17	34	52	72	78	90	111	146	151	146	112	85	81	74	55	36	18	6	6

<b>96</b>	5	14	30	46	64	72	84	109	142	149	142	109	81	74	66	49	31	15	5
<b>99</b>	4	12	29	41	57	67	79	107	138	145	138	106	77	68	57	43	28	13	4
<b>102</b>	3	11	29	40	51	64	78	107	134	140	134	109	77	64	51	40	29	11	4
<b>105</b>	3	9	30	44	51	62	79	107	129	134	129	109	79	61	50	44	31	10	3
<b>108</b>	5	10	29	50	60	68	83	105	122	127	122	105	82	64	59	51	30	9	3
<b>111</b>	7	11	28	52	74	82	93	109	117	121	116	108	91	81	71	55	29	8	3
<b>114</b>	5	9	28	49	85	97	111	122	123	123	121	120	108	96	80	53	31	8	4
<b>117</b>	4	7	29	49	88	108	128	137	140	139	138	137	123	106	82	51	31	7	4
<b>120</b>	7	8	26	50	85	112	137	145	153	155	152	144	132	109	82	53	29	7	5
<b>123</b>	9	8	23	51	80	105	137	145	156	160	155	145	132	105	79	55	26	8	6
<b>126</b>	8	9	22	50	77	100	130	140	150	155	150	142	127	100	77	54	24	9	7
<b>129</b>	7	10	20	48	77	99	119	132	140	145	142	136	119	99	78	51	21	10	8
<b>132</b>	9	10	17	41	72	100	111	122	131	135	134	128	113	100	77	45	19	11	9
<b>135</b>	10	10	14	32	63	94	106	116	125	127	127	121	109	96	69	36	16	11	9
<b>138</b>	11	11	13	24	52	81	102	114	120	121	121	117	105	87	57	27	13	11	10
<b>141</b>	11	12	13	20	41	66	93	110	114	117	116	111	94	72	44	21	13	12	11
<b>144</b>	11	12	13	17	32	53	78	95	102	107	104	97	75	55	32	18	13	13	11
<b>147</b>	12	13	14	15	24	41	59	72	83	88	83	74	57	38	24	16	14	13	12
<b>150</b>	12	13	14	14	18	29	41	51	61	64	59	54	42	29	18	15	14	14	13
<b>153</b>	13	13	15	14	15	21	28	35	43	44	40	36	29	21	16	15	15	14	13
<b>156</b>	13	14	15	15	15	16	19	23	27	28	27	23	21	17	15	15	15	14	14
<b>159</b>	13	14	15	16	15	15	15	15	18	17	18	16	16	15	15	16	16	15	14
<b>162</b>	14	14	15	16	16	15	15	15	15	15	15	15	15	15	16	16	16	15	14
<b>165</b>	14	14	15	16	17	16	16	16	15	15	15	16	16	16	17	16	16	15	14
<b>168</b>	14	14	15	16	16	17	17	17	17	17	17	17	17	17	17	16	15	15	14
<b>171</b>	14	14	15	15	16	16	17	17	17	17	17	17	17	17	16	16	15	14	14
<b>174</b>	14	14	15	15	15	16	16	16	16	17	17	16	16	16	16	15	15	14	14
<b>177</b>	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	14	14
<b>180</b>	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

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
<b>0</b>	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
<b>3</b>	25	25	24	23	23	22	22	22	22	22	22	23	23	23	24	25	25
<b>6</b>	25	23	22	21	20	19	19	18	18	18	19	19	20	21	22	23	25
<b>9</b>	24	22	20	18	17	16	16	15	15	15	16	16	17	18	20	22	24
<b>12</b>	23	20	18	16	15	14	13	12	12	12	12	13	15	16	18	20	23
<b>15</b>	22	19	16	14	12	10	9	9	8	9	9	10	12	14	16	19	22
<b>18</b>	21	17	14	12	9	8	7	7	6	7	7	8	9	12	15	17	21
<b>21</b>	20	16	13	9	7	6	6	7	7	6	7	6	7	9	13	16	20
<b>24</b>	19	15	11	7	7	6	16	26	28	25	18	11	6	8	11	15	19
<b>27</b>	18	13	9	6	12	22	39	49	55	48	40	28	7	6	9	14	18
<b>30</b>	17	12	7	5	26	47	66	76	79	75	66	48	26	6	7	12	17
<b>33</b>	17	11	8	11	48	71	91	98	99	97	90	72	44	18	6	11	16
<b>36</b>	15	9	10	24	59	89	108	114	114	114	107	90	62	29	9	9	15
<b>39</b>	14	8	16	42	79	104	119	127	127	127	118	104	80	44	11	8	14
<b>42</b>	13	6	28	61	97	115	130	138	138	138	130	115	95	59	20	8	13
<b>45</b>	12	5	42	75	109	127	141	148	149	148	140	126	107	71	27	8	12
<b>48</b>	11	5	47	85	117	137	150	156	159	156	149	135	116	83	40	9	11
<b>51</b>	10	10	56	93	122	145	158	164	168	164	157	143	123	94	52	11	10
<b>54</b>	9	15	64	100	127	150	164	174	176	172	165	150	129	101	61	17	9
<b>57</b>	8	20	72	106	131	155	171	181	183	179	173	156	133	107	68	24	8
<b>60</b>	7	26	78	112	138	160	180	188	191	188	180	162	138	113	75	29	7
<b>63</b>	6	36	83	118	145	166	187	197	200	197	186	167	144	119	82	35	6
<b>66</b>	5	43	88	123	152	174	194	206	210	206	193	174	150	124	89	39	8
<b>69</b>	4	47	92	128	159	183	202	214	218	215	201	181	157	129	92	43	12
<b>72</b>	4	52	97	133	164	189	210	221	226	221	209	188	162	133	96	50	7
<b>75</b>	3	59	100	137	169	196	215	226	232	227	215	195	168	136	101	59	4
<b>78</b>	4	63	102	141	173	198	218	230	236	231	218	197	173	140	103	64	4
<b>81</b>	7	64	105	142	174	202	220	232	239	234	220	201	175	143	107	67	7
<b>84</b>	8	65	110	146	180	208	225	233	240	235	224	207	179	146	109	67	9
<b>87</b>	10	65	108	145	179	206	223	232	239	234	222	206	181	147	110	68	9
<b>90</b>	11	62	102	138	171	197	212	229	238	231	213	197	174	141	105	66	10
<b>93</b>	11	63	104	140	131	142	187	227	234	227	189	142	131	140	108	67	13

<b>96</b>	11	58	95	122	119	130	182	224	230	226	184	131	117	120	94	60	13
<b>99</b>	11	50	81	103	112	127	182	222	229	223	186	128	110	101	80	51	13
<b>102</b>	13	44	73	96	113	136	192	222	227	222	194	136	112	95	73	46	14
<b>105</b>	14	41	70	94	118	151	202	221	224	220	203	153	118	93	69	43	16
<b>108</b>	16	40	69	96	125	168	205	218	220	217	204	169	128	97	68	43	18
<b>111</b>	17	42	70	101	138	179	204	213	215	212	202	180	141	104	70	45	20
<b>114</b>	18	44	77	111	148	182	200	208	211	208	200	184	152	115	78	47	21
<b>117</b>	20	47	82	118	153	178	196	203	207	204	197	182	157	122	86	51	23
<b>120</b>	22	49	87	122	153	174	190	200	203	200	194	178	157	127	90	54	25
<b>123</b>	23	52	89	121	147	168	182	195	198	193	188	173	154	126	91	58	27
<b>126</b>	24	53	87	119	143	164	178	188	192	187	182	167	151	123	91	59	28
<b>129</b>	24	53	84	116	140	159	174	181	186	182	175	161	144	119	89	58	28
<b>132</b>	24	51	81	110	134	152	168	175	180	176	169	155	137	114	85	56	27
<b>135</b>	23	48	78	105	128	146	161	168	171	169	161	148	131	109	82	54	26
<b>138</b>	21	45	75	101	124	140	153	159	161	160	153	141	126	105	79	51	24
<b>141</b>	21	43	70	96	120	134	145	151	153	151	144	135	120	99	74	48	22
<b>144</b>	20	42	67	90	112	127	138	143	146	142	137	127	111	91	68	44	21
<b>147</b>	19	40	62	82	104	119	131	135	137	135	129	118	102	83	62	41	19
<b>150</b>	18	37	57	76	94	108	120	126	128	126	119	108	93	77	57	37	19
<b>153</b>	17	32	51	69	84	97	107	113	115	113	107	97	84	70	51	32	16
<b>156</b>	17	28	45	60	74	86	94	99	101	100	95	87	76	63	46	29	17
<b>159</b>	16	22	38	52	64	74	81	86	88	86	82	75	66	55	40	26	17
<b>162</b>	15	20	31	43	54	63	69	73	75	73	70	64	56	46	33	23	15
<b>165</b>	15	19	26	33	43	51	56	60	61	60	57	52	45	36	27	20	15
<b>168</b>	15	16	21	26	32	38	43	46	46	46	43	39	33	26	21	17	15
<b>171</b>	15	16	17	21	24	27	30	31	31	31	30	27	24	21	18	16	15
<b>174</b>	14	15	16	17	18	19	20	21	21	21	20	19	18	17	16	15	15
<b>177</b>	14	15	15	15	15	15	16	16	16	16	16	16	15	15	15	15	15
<b>180</b>	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

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

Zone	Lumens	% Total	Zone	Lumens	% Total
0-5	0.6	0.10%	90-95	57.3	5.20%
05-10	1.9	0.20%	95-100	49.8	4.50%
10-15	3.2	0.30%	100-105	47.6	4.30%
15-20	4.6	0.40%	105-110	47.7	4.30%
20-25	6.5	0.60%	110-115	48.9	4.40%
25-30	10.3	0.90%	115-120	50.7	4.60%
30-35	15.5	1.40%	120-125	48.6	4.40%
35-40	21.2	1.90%	125-130	43.3	3.90%
40-45	27.6	2.50%	130-135	37.6	3.40%
45-50	33.7	3.00%	135-140	31.5	2.80%
50-55	39.5	3.60%	140-145	24.9	2.20%
55-60	45.4	4.10%	145-150	18.2	1.60%
60-65	50.8	4.60%	150-155	12.4	1.10%
65-70	55.8	5.00%	155-160	7.9	0.70%
70-75	60.6	5.50%	160-165	5	0.50%
75-80	63.6	5.70%	165-170	2.9	0.30%
80-85	65	5.90%	170-175	1.3	0.10%
85-90	65	5.90%	175-180	0.4	0%

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	1.08	1.08	1.08	1.08	0.99	0.99	0.99	0.52	0.84	0.84	0.84	0.7	0.7	0.7	0.58	0.58	0.58	0.52
1	0.92	0.85	0.79	0.73	0.84	0.78	0.72	0.32	0.65	0.6	0.56	0.53	0.49	0.46	0.41	0.39	0.36	0.31
2	0.81	0.71	0.62	0.55	0.74	0.65	0.57	0.22	0.53	0.47	0.42	0.43	0.38	0.34	0.33	0.29	0.26	0.21
3	0.73	0.6	0.51	0.43	0.66	0.55	0.46	0.17	0.45	0.38	0.33	0.36	0.3	0.26	0.27	0.23	0.2	0.15
4	0.66	0.52	0.42	0.35	0.59	0.48	0.39	0.13	0.39	0.32	0.26	0.31	0.25	0.21	0.23	0.19	0.15	0.11
5	0.6	0.46	0.36	0.29	0.54	0.42	0.33	0.1	0.34	0.27	0.21	0.27	0.21	0.17	0.2	0.16	0.12	0.09
6	0.55	0.4	0.31	0.24	0.49	0.37	0.28	0.08	0.3	0.23	0.18	0.24	0.18	0.14	0.18	0.14	0.1	0.07
7	0.5	0.36	0.27	0.2	0.46	0.33	0.25	0.07	0.27	0.2	0.15	0.21	0.16	0.12	0.16	0.12	0.09	0.06
8	0.46	0.32	0.24	0.18	0.42	0.3	0.22	0.06	0.24	0.18	0.13	0.19	0.14	0.1	0.15	0.1	0.07	0.05
9	0.43	0.29	0.21	0.15	0.39	0.27	0.19	0.05	0.22	0.16	0.11	0.18	0.12	0.09	0.13	0.09	0.06	0.04
10	0.4	0.27	0.19	0.13	0.36	0.24	0.17	0.04	0.2	0.14	0.1	0.16	0.11	0.08	0.12	0.08	0.05	0.03

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:

16/07/2015

---

Test Engineer

*Duly authorised to sign on behalf of:*

Photometric and Optical Testing Services LLP

Checked by:

Signature:



---

Print Name:

G John

---

Date: 21-07-2015

---

Technical Director

*Duly authorised to sign on behalf of:*

Photometric and Optical Testing Services LLP