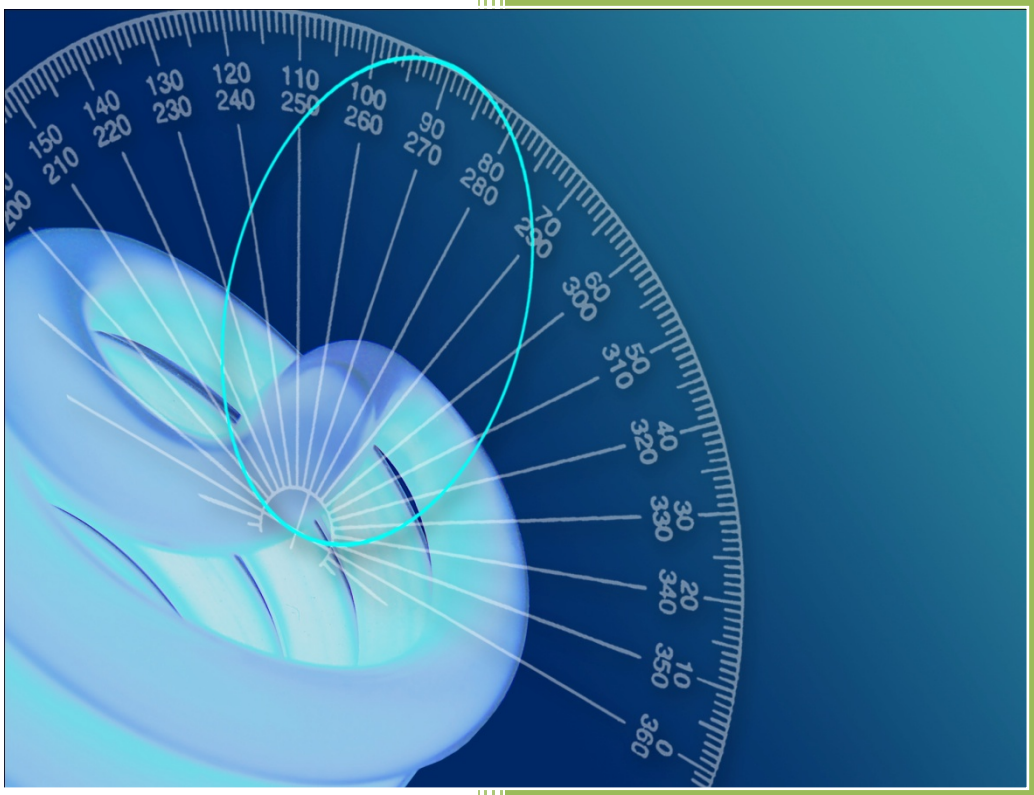
PHOTOMETRIC & OPTICAL TESTING

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/DC16194	Report Date: 29/09/2016	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

Manufacturer: FAR EASTERN MANUFACTURING	Source Type: LED
Model: LTSP40WW	

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	Source Type: LED
Model: LTSP40WW	Luminaire Type: CEILING PANEL
Power Supply Used: Kikusui PCR1000M Voltage Stabiliser S/N SM01191	
Voltage(AC V) = 230.0	Current (mA)= 177
Power (Watts)= 38.72	Power factor= 0.951

Integrating Sphere Test

Date of Test: 23/09/2016	Ambient Temperature:25°C
Measurement Filename: LTSP40WW	
Instrument Used: Labsphere model 2m integrating sphere spectroradiometer AS-02949-012	
Integrating Sphere Size: 2m	Measurement Geometry (2π / 4π): 4π
Sample Orientation: Facing Downwards	Auxiliary Correction Applied: YES
Comments:	
Date of Last Calibration (Operating Hours): 16-09-2016 (1:31)	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: ± 0.67% (*k=2)*	

Results

Flux (lumens): 3354	
CIE 1931 Chromaticity Cx: 0.4412	CIE 1931 Chromaticity Cy: 0.4060
CRI (%):81.33	CCT (K): 2943

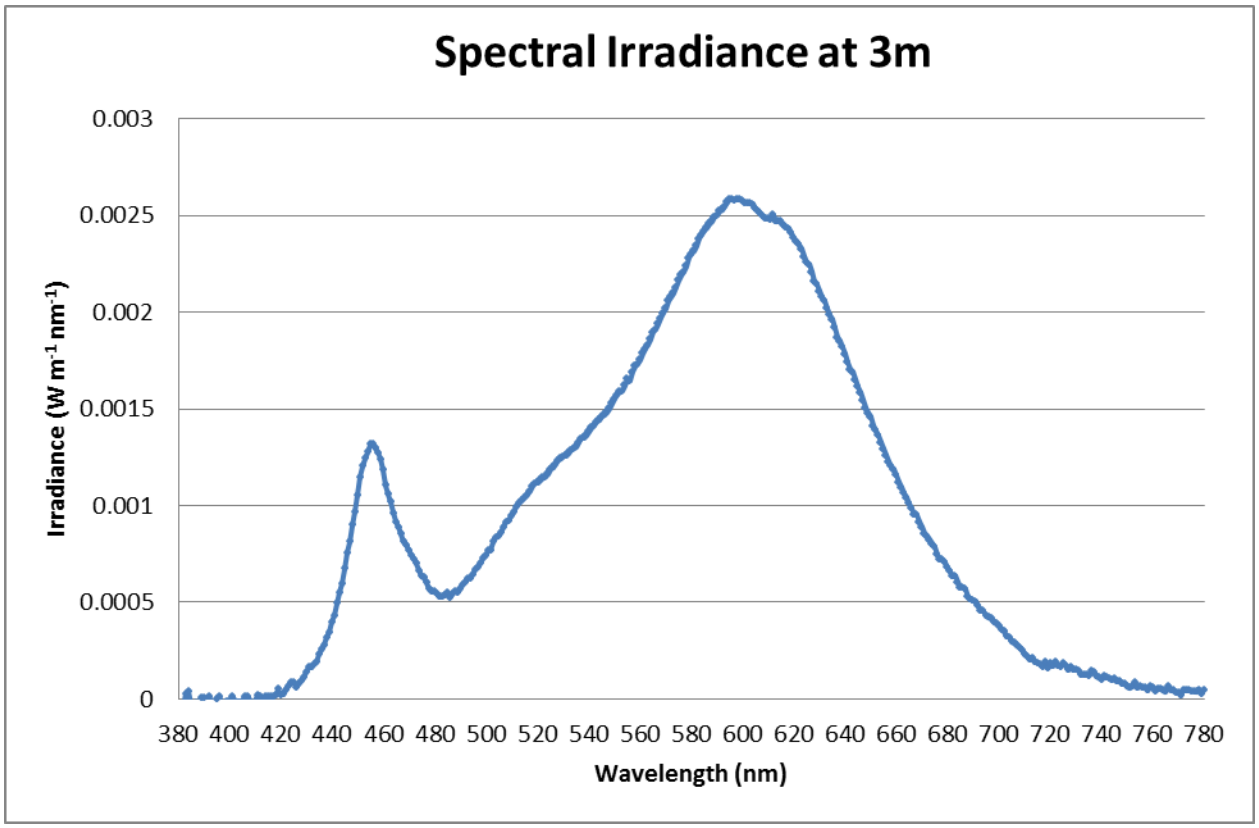


Figure 1: Spectral Irradiance

Figure 2: CIE 1931 diagram.

Goniophotometer Test		
Date of Test: 28/09/2016	Ambient Temperature: 25°C	
Measurement Filename: LTSP40WW		
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): 60	
Reference Photometer Calibration Uncertainty: ± 2.4% (*k=2*, 20-200 lux, CIE illuminant A source)		
Scan Set Up		
Direction	**Range**	**Increment**
Inclination Zone 1	0-90°	3°
Azimuth	0-360°	10°
Results		
Integrated Luminous Flux (lumens):3354	Peak Intensity (3° Spot, candelas): 1204.1	Efficacy (lumens/Watt): 86.6
Beam Angle (50% of max intensity C0-180, degrees): 111.8		
Photometric Filename (IES LM-63-2002): LTSP40WW		
IES File – Absolute or Relative Format? ABSOLUTE		
Photometric Filename (EULUMDAT): LTSP40WW		
EULUMDAT File – Absolute or Relative Format? ABSOLUTE		

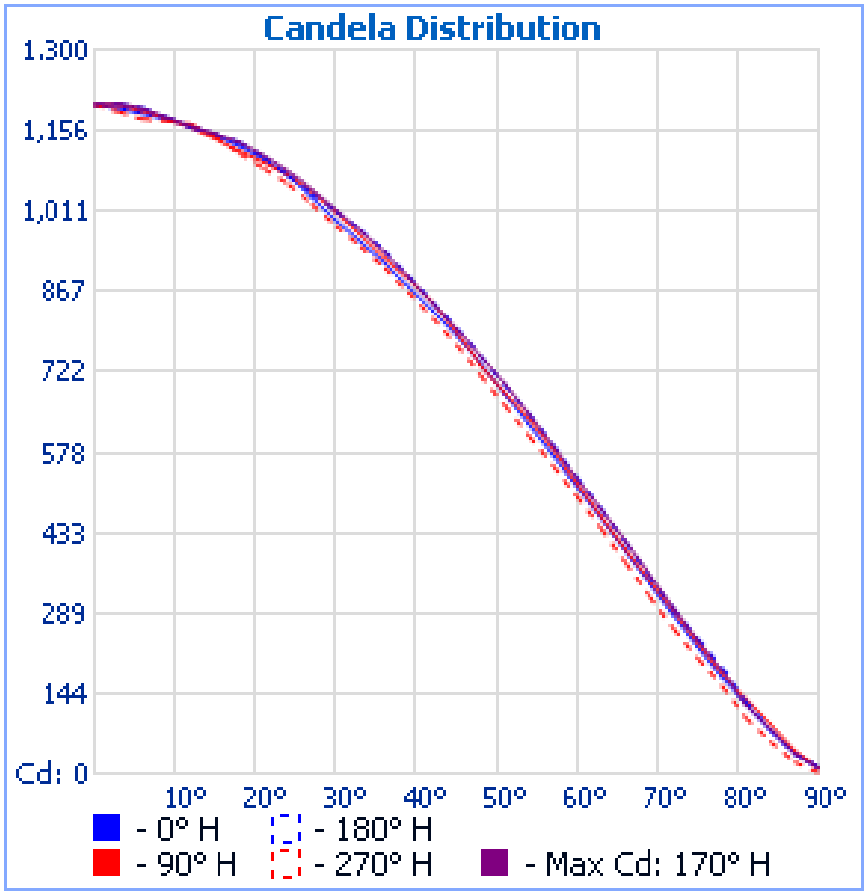


Figure 3: Far-Field Luminous Intensity (C0-180, Cartesian Coordinates)

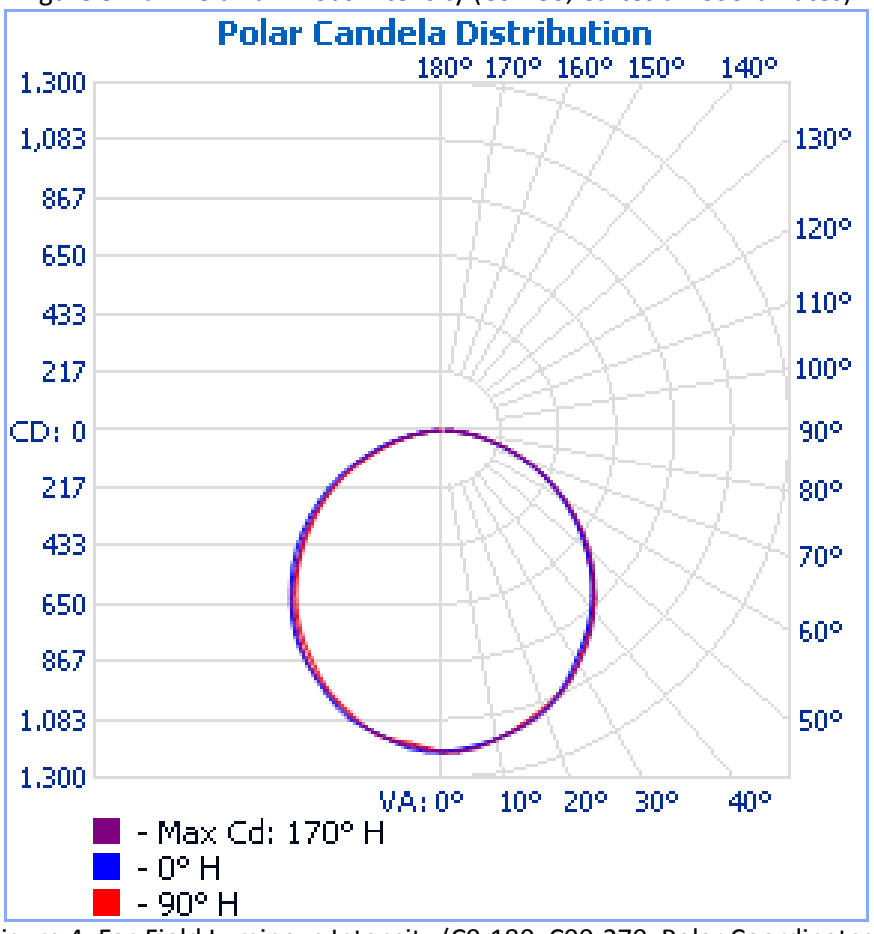


Figure 4: Far-Field Luminous Intensity (C0-180, C90-270, Polar Coordinates)

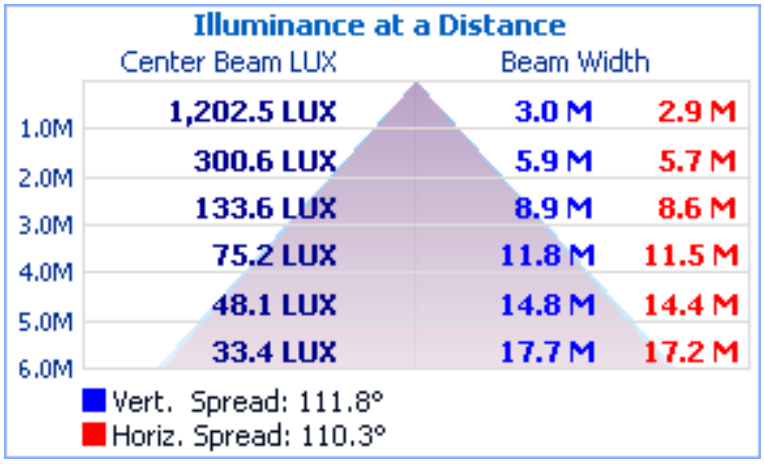


Figure 5. Cone diagram for mounting height of 6 metres.

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	16.7	18.3	17.1	18.7	19.0	16.5	18.1	16.9	18.5	18.8
	3H	18.3	19.8	18.7	20.1	20.5	18.0	19.5	18.4	19.9	20.2
	4H	19.0	20.4	19.4	20.7	21.1	18.7	20.1	19.0	20.4	20.8
	6H	19.5	20.8	19.9	21.2	21.5	19.1	20.4	19.5	20.8	21.2
	8H	19.6	20.9	20.0	21.3	21.7	19.2	20.5	19.6	20.8	21.2
	12H	19.7	21.0	20.2	21.3	21.7	19.2	20.5	19.7	20.8	21.2
4H	2H	17.4	18.8	17.8	19.2	19.6	17.2	18.7	17.6	19.0	19.4
	3H	19.2	20.4	19.6	20.8	21.2	18.9	20.2	19.4	20.5	20.9
	4H	20.0	21.1	20.5	21.5	21.9	19.7	20.8	20.2	21.2	21.6
	6H	20.6	21.6	21.1	22.0	22.5	20.2	21.2	20.7	21.6	22.1
	8H	20.9	21.8	21.3	22.2	22.7	20.4	21.3	20.9	21.7	22.2
	12H	21.1	21.9	21.5	22.3	22.8	20.5	21.3	21.0	21.8	22.3
8H	4H	20.3	21.2	20.8	21.7	22.1	20.0	20.9	20.5	21.4	21.8
	6H	21.1	21.8	21.6	22.3	22.8	20.7	21.4	21.1	21.9	22.4
	8H	21.5	22.1	22.0	22.6	23.1	20.9	21.6	21.4	22.1	22.6
	12H	21.7	22.3	22.3	22.8	23.3	21.1	21.6	21.6	22.1	22.6
12H	4H	20.4	21.2	20.9	21.6	22.1	20.1	20.9	20.5	21.3	21.8
	6H	21.2	21.9	21.7	22.4	22.9	20.8	21.4	21.3	21.9	22.4
	8H	21.6	22.2	22.1	22.7	23.2	21.0	21.6	21.5	22.1	22.6

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	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202
3	1196	1197	1197	1199	1199	1200	1200	1201	1202	1202	1202	1202	1203	1203	1203	1204	1204	1204	1204
6	1187	1187	1188	1189	1189	1190	1191	1191	1192	1192	1192	1192	1192	1192	1193	1195	1196	1196	1197
9	1177	1175	1175	1173	1174	1175	1176	1177	1178	1178	1179	1179	1178	1177	1178	1180	1181	1180	1180
12	1164	1160	1157	1157	1160	1161	1160	1160	1160	1162	1164	1166	1165	1164	1166	1167	1167	1164	1162
15	1148	1141	1137	1139	1144	1146	1144	1144	1141	1141	1144	1150	1151	1146	1145	1149	1152	1150	1150
18	1128	1122	1114	1121	1126	1125	1123	1125	1123	1119	1123	1132	1137	1130	1121	1126	1130	1135	1135
21	1105	1099	1093	1102	1105	1098	1095	1099	1099	1099	1099	1108	1120	1112	1101	1103	1108	1111	1108
24	1075	1073	1071	1075	1079	1070	1065	1067	1070	1076	1070	1073	1085	1082	1074	1074	1082	1083	1076
27	1037	1043	1042	1046	1048	1040	1039	1038	1041	1047	1040	1037	1045	1046	1048	1047	1048	1052	1044
30	995	1009	1008	1010	1010	1003	1007	1010	1011	1010	1008	1007	1007	1010	1019	1013	1009	1014	1012
33	957	973	966	970	971	966	969	969	973	968	966	971	969	975	982	974	971	977	978
36	918	931	918	929	927	926	927	919	928	927	919	931	930	936	936	934	934	937	940
39	877	883	877	881	879	883	880	873	886	891	880	891	886	891	887	892	897	894	896
42	833	833	838	838	835	841	838	831	842	848	840	841	842	844	846	849	852	847	849
45	787	786	792	789	786	797	793	789	794	793	793	787	796	797	801	799	801	799	801
48	738	739	741	739	737	743	740	744	741	735	740	737	751	744	750	748	753	752	751
51	684	688	683	690	691	688	685	691	689	686	689	687	700	691	696	699	698	703	700
54	628	631	638	630	636	636	629	634	635	638	635	639	641	642	642	641	651	646	647
57	573	572	582	577	580	586	578	574	582	583	583	586	585	590	591	585	595	589	591
60	517	514	521	526	521	527	521	519	526	523	527	527	525	530	531	530	535	531	534
63	460	459	469	472	460	465	465	467	471	462	468	466	470	471	466	476	480	476	476
66	401	406	407	413	409	407	409	411	412	404	405	406	412	414	411	422	412	419	417
69	343	349	348	348	353	349	352	355	350	348	346	349	350	353	353	354	351	359	356
72	285	290	292	293	298	296	296	298	291	293	293	293	294	297	298	294	296	298	297
75	229	233	235	237	240	246	239	238	236	236	238	236	239	244	240	239	240	240	243
78	173	178	181	185	186	191	186	183	185	180	182	180	188	189	186	188	188	185	191
81	127	132	143	145	144	147	142	144	138	136	132	136	137	137	134	136	137	125	131
84	79	87	89	95	90	93	94	92	90	91	84	86	85	84	81	86	81	82	82
87	39	41	42	41	47	44	43	39	43	44	39	35	39	38	39	34	35	37	37
90	10	11	11	12	13	10	10	10	11	11	11	7	9	8	8	8	9	10	12

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	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202	1202
3	1203	1202	1200	1198	1196	1194	1192	1191	1190	1189	1190	1190	1191	1192	1194	1194	1195
6	1196	1196	1194	1191	1187	1183	1180	1178	1177	1177	1178	1180	1182	1184	1186	1187	1187
9	1180	1182	1181	1179	1177	1174	1173	1174	1174	1173	1172	1172	1174	1176	1177	1178	1177
12	1161	1163	1166	1166	1163	1160	1161	1166	1168	1164	1159	1158	1161	1164	1164	1163	1164
15	1148	1149	1149	1148	1144	1140	1141	1144	1145	1140	1136	1137	1144	1147	1145	1144	1146
18	1134	1129	1129	1126	1122	1117	1118	1118	1115	1114	1111	1115	1123	1125	1123	1118	1125
21	1109	1107	1104	1100	1094	1092	1095	1092	1088	1092	1091	1089	1093	1098	1096	1091	1098
24	1078	1080	1074	1069	1064	1062	1067	1065	1060	1070	1066	1055	1060	1063	1063	1062	1068
27	1045	1045	1042	1037	1032	1030	1034	1031	1025	1036	1030	1024	1032	1032	1033	1032	1038
30	1008	1006	1005	1000	995	993	998	993	985	994	992	992	999	997	1001	1000	1007
33	971	968	966	964	958	955	957	950	948	949	951	955	961	960	965	962	969
36	932	930	926	925	919	917	916	906	910	904	907	914	919	917	924	917	927
39	888	889	877	881	875	873	874	864	867	863	865	866	875	873	873	873	885
42	839	840	832	838	829	825	820	820	820	820	817	818	824	829	830	826	839
45	791	791	785	788	781	774	764	771	770	768	768	770	770	776	785	778	784
48	744	745	735	736	726	724	717	719	718	714	721	722	717	721	735	731	727
51	697	690	684	686	672	672	668	670	663	663	667	671	666	670	681	677	676
54	642	641	624	631	621	616	614	615	608	606	610	612	613	615	618	629	624
57	584	584	570	573	568	561	556	559	554	550	552	556	559	562	563	570	570
60	526	526	514	511	508	500	498	497	500	493	497	497	502	504	511	510	511
63	471	476	455	449	448	442	442	439	441	438	444	440	445	442	456	457	454
66	415	412	398	397	390	386	382	384	380	381	386	381	389	386	397	393	396
69	356	349	336	339	328	328	322	326	320	322	326	323	327	327	329	334	336
72	297	293	282	283	272	272	268	270	262	267	270	268	268	275	273	280	277
75	240	236	228	223	222	214	214	213	209	213	214	212	214	223	219	223	222
78	184	180	173	167	161	162	160	159	158	162	160	161	161	170	168	168	170
81	119	120	113	108	107	102	105	99	102	103	107	109	112	117	120	125	122
84	73	65	65	56	56	56	58	56	60	58	59	62	62	67	73	74	77
87	30	24	21	18	19	18	16	18	22	21	18	23	23	26	28	29	34
90	4	6	3	3	3	2	1	2	2	2	2	3	4	5	6	8	8

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

Zone	Lumens	% Total
0-5	28.7	0.80%
05-10	84.2	2.50%
10-15	137.6	4.10%
15-20	186.1	5.50%
20-25	226.6	6.70%
25-30	261.4	7.70%
30-35	286.8	8.50%
35-40	299.6	8.80%
40-45	305.8	9.00%
45-50	301.6	8.90%
50-55	284.1	8.40%
55-60	260.3	7.70%
60-65	229.1	6.80%
65-70	187.2	5.50%
70-75	143.6	4.20%
75-80	100.1	2.90%
80-85	54.2	1.60%
85-90	15.8	0.50%

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	0.99	0.95	1.06	1.01	0.98	0.84	0.97	0.94	0.91	0.93	0.91	0.88	0.9	0.88	0.86	0.83
2	0.99	0.9	0.83	0.78	0.96	0.88	0.82	0.71	0.85	0.79	0.75	0.82	0.77	0.73	0.79	0.75	0.72	0.69
3	0.9	0.79	0.71	0.64	0.87	0.78	0.7	0.6	0.75	0.68	0.63	0.72	0.66	0.62	0.69	0.65	0.61	0.58
4	0.82	0.7	0.61	0.55	0.8	0.69	0.61	0.52	0.66	0.59	0.53	0.64	0.58	0.53	0.62	0.56	0.52	0.5
5	0.76	0.63	0.54	0.47	0.73	0.62	0.53	0.45	0.59	0.52	0.46	0.57	0.51	0.46	0.56	0.5	0.45	0.43
6	0.7	0.56	0.47	0.41	0.68	0.55	0.47	0.39	0.54	0.46	0.4	0.52	0.45	0.4	0.5	0.44	0.4	0.38
7	0.65	0.51	0.42	0.36	0.63	0.5	0.42	0.35	0.49	0.41	0.36	0.47	0.4	0.35	0.46	0.4	0.35	0.33
8	0.6	0.47	0.38	0.32	0.59	0.46	0.38	0.31	0.45	0.37	0.32	0.43	0.37	0.32	0.42	0.36	0.31	0.3
9	0.56	0.43	0.35	0.29	0.55	0.42	0.34	0.28	0.41	0.34	0.29	0.4	0.33	0.29	0.39	0.33	0.28	0.27
10	0.53	0.39	0.32	0.26	0.51	0.39	0.31	0.26	0.38	0.31	0.26	0.37	0.31	0.26	0.36	0.3	0.26	0.24

Table 4. Utilisation Factor Table

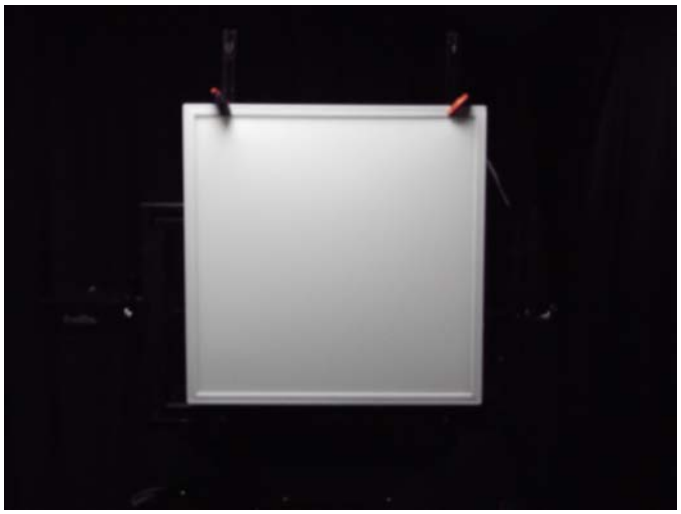


Photo 1: Luminaire on goniometer mount

Signature:

_____

Print Name:

D CHAMBERS

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Date:
29/09/2016

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Technical Manager
Duly authorised to sign on behalf of:
Photometric and Optical Testing Services LLP