



LM-79-08 Test Report

for

P.Q.L., Inc.

2285 Ward Avenue / Simi Valley, CA 93065

FLOOD light

Model: 84132

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18050002a

The laboratory that conducted the testing detailed in this report has been accredited for SSL by NVLAP.

Review by:

Engineer: April Zou
May 14, 2018

Approved by



Manager: Jim Zhang
May 14, 2018

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Test Summary

Sample Tested: **84132**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
135.6	2621.7	19.34	0.9924
CCT (K)	CRI	Stabilization Time (Light & Power)	
4041	71.8	60	

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

Test specifications:

Date of Receipt	: May 04, 2018
Date of Test	: May 04, 2018
Test item	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
Reference Standard	: IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

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Sample Photos



Overview of the sample

Equipment Under Test (EUT)

Name	: FLOOD light
Model	: 84132
Electrical Ratings	: 120-277V, 50/60Hz
Product Description	: 4000K
Manufacturer	: P.Q.L., Inc.
Address	: 2285 Ward Avenue / Simi Valley, CA 93065

TEST RESULTS

Test ambient temperature was 24.8°C.

Base orientation was base up. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 60 minutes, and the total operating time including stabilization was 95 minutes.

The photometric distance of Goniophotometer is 2.47 m.

Luminous data was taken at 0.5° vertical intervals and 10.0° horizontal intervals.

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.162	0.077
Power Factor	0.9924	0.9070
Test Power (W)	19.34	19.28
THD A%	6.03	9.04
Luminous Efficacy (lm/W)	135.6	135.8
Total Luminous Flux (lm)	2621.7	2617.5
Color Rendering Index (CRI)	71.8	
R9	-15	
Correlated Color Temperature (CCT) (K)	4041	
Chromaticity (Chroma x, Chroma y)	(0.3789, 0.3770)	
Chromaticity (Chroma u, Chroma v)	(0.2240, 0.3343)	
Chromaticity (Chroma u', Chroma v')	(0.2240, 0.5014)	
Duv	0.0005	
Average Beam Angle (°)	95.1	
Center Beam Candle Power (cd)	1314	
Spacing Criteria	1.11 (0°-180°)/ 1.28 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	96.45%	
Zonal Lumens in the 60°-90°Zone	3.46%	
Zonal Lumens in the 90°-120°Zone	0.01%	
Zonal Lumens in the 120°-180°Zone	0.08%	

Special Color Rendering Indices	
R1	71
R2	78
R3	79
R4	71
R5	68
R6	66
R7	83
R8	59
R9	-15
R10	43
R11	63
R12	31
R13	71
R14	88

Table 2: Test data per Goniophotometer Method

Note: According to CIE 1976 (u', v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Spectral Power Distribution

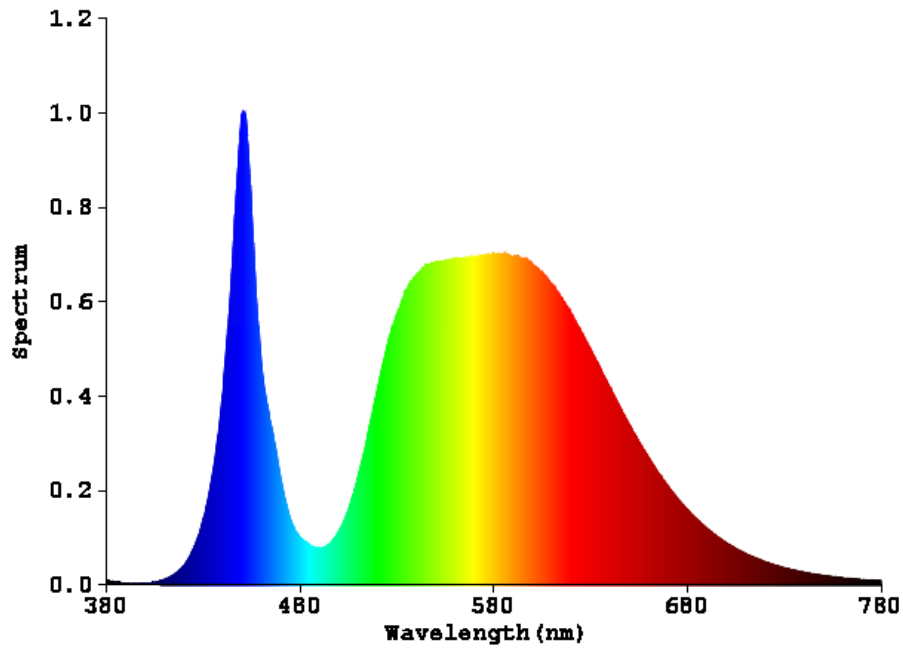


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	125.507	4.79%
10- 20	361.931	13.81%
20- 30	547.69	20.89%
30- 40	646.604	24.66%
40- 50	554.129	21.14%
50- 60	292.847	11.17%
60- 70	85.491	3.26%
70- 80	4.761	0.18%
80- 90	0.353	0.01%
90-100	0.025	0.00%
100-110	0.082	0.00%
110-120	0.168	0.01%
120-130	0.293	0.01%
130-140	0.439	0.02%
140-150	0.508	0.02%
150-160	0.449	0.02%
160-170	0.302	0.01%
170-180	0.108	0.00%
Total	2621.7	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2528.708	96.45%
60- 90	90.605	3.46%
0-90	2619.313	99.91%
90- 180	2.374	0.09%
0- 180	2621.7	100%

Table 3: Zonal Lumen Data

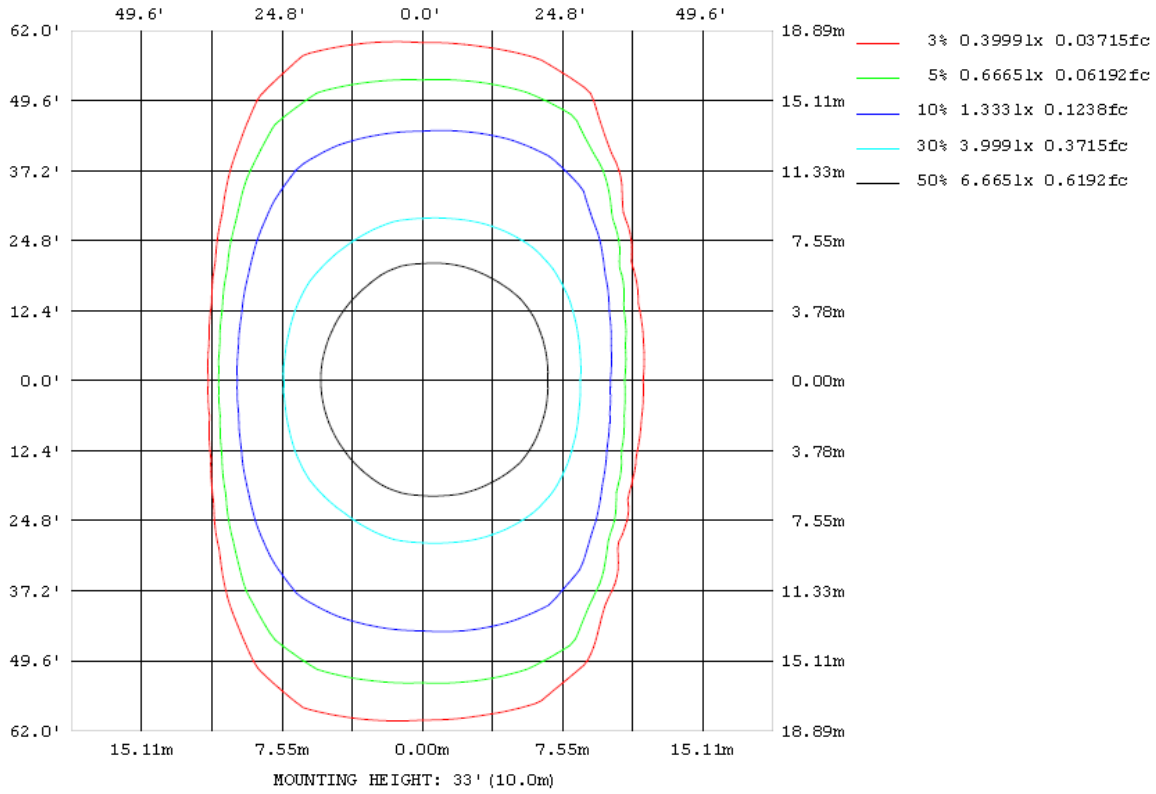


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

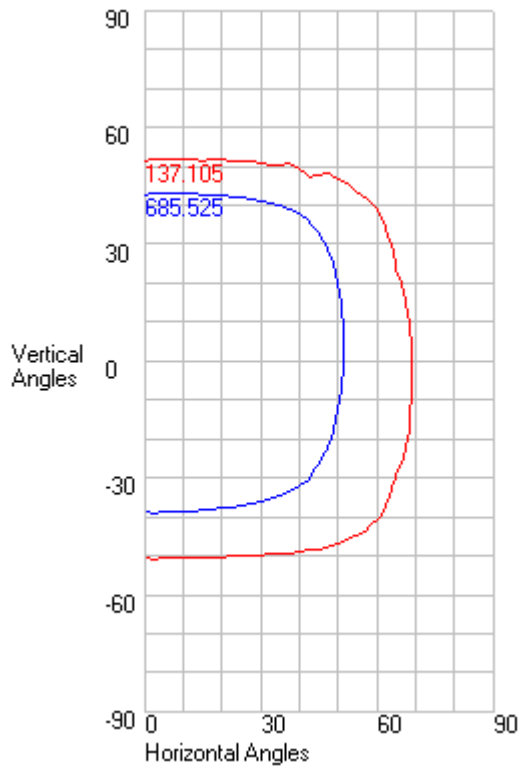


Chart 3: Isocandela Plot

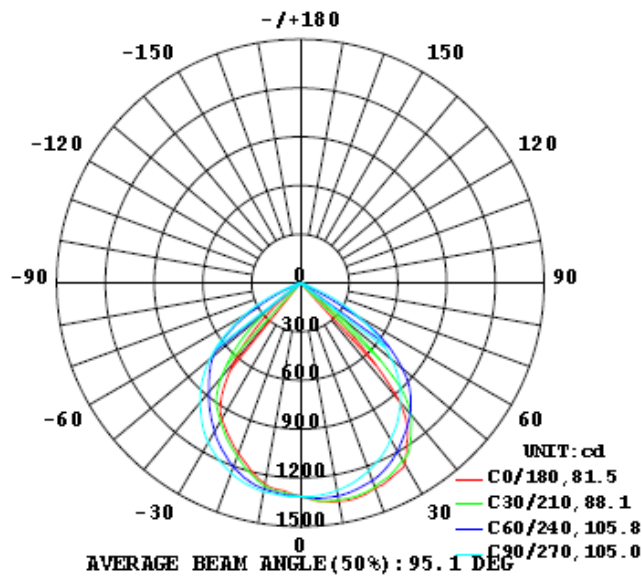


Chart 4: Polar Candela Distribution

Luminous Intensity Data

Table --1 UNIT: cd

C(DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314
5	1348	1348	1346	1344	1340	1335	1329	1323	1317	1313	1310	1308	1305	1302	1299	1295	1290	1284	1281
10	1365	1366	1363	1356	1348	1340	1330	1319	1307	1298	1294	1290	1285	1278	1273	1270	1265	1260	1257
15	1366	1367	1364	1356	1349	1334	1318	1300	1282	1270	1265	1258	1251	1239	1222	1209	1202	1195	1192
20	1345	1346	1339	1337	1328	1314	1293	1269	1246	1230	1225	1217	1199	1175	1154	1136	1124	1118	1115
25	1322	1324	1312	1307	1285	1273	1255	1226	1195	1178	1173	1160	1129	1100	1078	1065	1051	1044	1042
30	1284	1293	1282	1262	1239	1216	1195	1168	1133	1111	1106	1086	1050	1021	995	981	972	968	967
35	1152	1160	1166	1184	1189	1154	1124	1096	1063	1041	1034	1000	958	930	916	904	875	849	843
40	943	965	1010	1060	1081	1089	1051	1020	984	960	952	912	871	853	827	762	694	647	637
45	420	461	583	780	927	965	957	928	889	860	852	818	795	770	672	560	461	385	368
50	149	155	176	278	564	793	818	799	766	732	728	710	705	614	471	301	178	110	94.8
55	69.1	71.0	78.1	91.9	142	436	640	633	611	584	588	595	564	418	208	66.7	25.7	17.0	14.7
60	5.74	4.85	18.1	34.2	47.1	83.2	365	437	425	414	432	450	375	171	25.4	8.23	4.47	3.45	3.25
65	0.53	0.55	0.56	0.92	10.1	18.9	58.5	221	217	224	250	270	152	14.0	3.31	2.90	2.83	2.74	2.63
70	0.25	0.26	0.30	0.37	0.48	1.38	5.66	37.7	50.0	62.7	80.5	87.8	10.3	2.30	2.27	2.19	2.25	2.27	2.21
75	0.04	0.06	0.15	0.20	0.20	0.24	0.35	1.15	5.27	6.57	7.22	6.62	2.30	1.46	1.62	1.77	1.86	1.91	1.88
80	0.02	0.02	0.02	0.02	0.02	0.04	0.12	0.15	0.12	0.17	0.38	0.66	0.94	1.12	1.28	1.45	1.56	1.64	1.62
85	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.04	0.04	0.21	0.43	0.65	0.83	0.95	0.85	0.96	1.02	1.00
90	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.01	0.02	0.02	0.02
95	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.03	0.04	0.04	0.03	0.03	0.03	0.02	0.01	0.00	0.00	0.01	0.01
100	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.06	0.07	0.07	0.06	0.06	0.06	0.04	0.03	0.01	0.01	0.01	0.01
105	0.01	0.01	0.02	0.03	0.04	0.06	0.08	0.10	0.11	0.11	0.10	0.10	0.09	0.07	0.06	0.03	0.02	0.01	0.02
110	0.02	0.03	0.04	0.05	0.07	0.09	0.12	0.14	0.16	0.16	0.15	0.14	0.13	0.11	0.09	0.07	0.04	0.03	0.05
115	0.05	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.22	0.22	0.21	0.19	0.18	0.16	0.14	0.11	0.09	0.07	0.11
120	0.10	0.11	0.12	0.15	0.17	0.21	0.24	0.25	0.29	0.29	0.28	0.26	0.24	0.22	0.20	0.17	0.15	0.14	0.20
125	0.17	0.19	0.20	0.22	0.25	0.29	0.32	0.33	0.37	0.38	0.36	0.34	0.32	0.30	0.28	0.26	0.24	0.24	0.32
130	0.26	0.28	0.29	0.31	0.32	0.36	0.41	0.45	0.45	0.48	0.46	0.44	0.42	0.39	0.37	0.37	0.34	0.34	0.47
135	0.37	0.38	0.40	0.41	0.43	0.46	0.50	0.55	0.55	0.59	0.57	0.55	0.52	0.50	0.48	0.47	0.45	0.47	0.63
140	0.46	0.47	0.48	0.51	0.53	0.58	0.61	0.63	0.65	0.67	0.67	0.66	0.64	0.62	0.58	0.56	0.56	0.59	0.79
145	0.56	0.57	0.58	0.59	0.62	0.64	0.69	0.71	0.75	0.77	0.77	0.77	0.73	0.70	0.68	0.65	0.66	0.68	0.95
150	0.68	0.67	0.69	0.70	0.69	0.70	0.72	0.76	0.77	0.79	0.81	0.81	0.79	0.78	0.78	0.76	0.76	0.78	1.07
155	0.79	0.78	0.79	0.81	0.78	0.76	0.78	0.79	0.80	0.80	0.83	0.84	0.84	0.85	0.86	0.88	0.86	0.88	1.16
160	0.91	0.88	0.88	0.88	0.86	0.83	0.81	0.81	0.82	0.81	0.88	0.90	0.90	0.92	0.94	0.93	0.92	0.98	1.25
165	0.97	0.93	0.95	0.96	0.95	0.92	0.90	0.89	0.89	0.91	0.96	0.98	0.98	0.99	0.99	0.98	0.97	1.02	1.22
170	1.06	1.00	1.02	1.04	1.03	0.98	0.96	0.95	0.97	0.98	0.99	1.02	1.02	1.02	1.02	1.03	1.03	1.08	1.19
175	1.19	1.12	1.15	1.16	1.16	1.13	1.10	1.10	1.09	1.05	1.10	1.13	1.12	1.13	1.14	1.15	1.14	1.17	1.19
180	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12

Table 4: Luminous Intensity Data

Table--2 UNIT: cd

C (DEG) γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314	1314		
5	1283	1289	1294	1298	1302	1306	1308	1310	1314	1319	1322	1329	1336	1342	1345	1347	1347		
10	1259	1264	1269	1275	1280	1288	1293	1298	1305	1313	1324	1336	1344	1352	1361	1366	1367		
15	1196	1202	1208	1223	1241	1255	1265	1272	1282	1295	1310	1327	1340	1352	1360	1366	1370		
20	1119	1124	1136	1157	1180	1204	1227	1237	1245	1261	1280	1300	1320	1333	1340	1343	1351		
25	1044	1051	1065	1081	1103	1137	1172	1191	1195	1215	1238	1265	1276	1289	1307	1315	1328		
30	968	973	984	1001	1023	1055	1101	1129	1135	1156	1181	1204	1217	1239	1258	1282	1295		
35	852	874	903	918	933	969	1017	1048	1054	1079	1104	1126	1155	1188	1189	1173	1162		
40	651	692	757	823	849	876	915	953	960	985	1019	1053	1085	1088	1066	1022	975		
45	388	455	552	661	758	792	815	849	855	884	926	955	970	941	832	628	492		
50	111	173	284	451	599	701	709	724	727	757	798	824	803	632	330	187	163		
55	15.7	20.4	49.3	182	392	552	591	579	573	599	629	640	510	181	102	84.6	76.2		
60	3.10	3.56	6.50	20.4	138	353	443	421	403	415	434	406	101	53.3	37.7	25.0	11.5		
65	2.47	2.37	2.39	2.84	8.65	119	263	249	220	216	222	82.1	20.4	10.7	1.25	0.59	0.55		
70	2.07	1.96	1.89	1.95	2.00	6.53	78.0	84.3	59.1	50.4	44.8	4.74	1.81	0.52	0.40	0.33	0.27		
75	1.76	1.65	1.56	1.47	1.34	1.52	3.97	6.92	5.08	3.70	1.50	0.43	0.33	0.21	0.21	0.17	0.09		
80	1.51	1.40	1.29	1.17	1.03	0.90	0.64	0.41	0.18	0.13	0.17	0.14	0.10	0.01	0.01	0.01	0.01		
85	0.91	0.80	0.77	0.74	0.75	0.60	0.42	0.22	0.06	0.04	0.02	0.01	0.01	0.01	0.01	0.01	0.01		
90	0.01	0.01	0.01	0.01	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.00		
95	0.01	0.01	0.01	0.01	0.02	0.04	0.05	0.05	0.06	0.06	0.05	0.04	0.03	0.01	0.01	0.00	0.00		
100	0.01	0.01	0.02	0.03	0.06	0.09	0.10	0.11	0.11	0.11	0.10	0.08	0.06	0.04	0.02	0.01	0.00		
105	0.02	0.03	0.05	0.08	0.11	0.14	0.16	0.17	0.18	0.17	0.16	0.13	0.11	0.07	0.04	0.02	0.01		
110	0.05	0.06	0.10	0.14	0.17	0.21	0.23	0.24	0.24	0.23	0.21	0.19	0.15	0.12	0.08	0.05	0.04		
115	0.11	0.13	0.17	0.20	0.24	0.27	0.28	0.29	0.30	0.29	0.26	0.23	0.20	0.16	0.13	0.10	0.08		
120	0.20	0.22	0.25	0.29	0.32	0.33	0.35	0.36	0.37	0.36	0.33	0.30	0.26	0.23	0.19	0.16	0.15		
125	0.32	0.34	0.36	0.39	0.41	0.43	0.45	0.46	0.46	0.45	0.42	0.38	0.34	0.31	0.28	0.26	0.24		
130	0.47	0.48	0.50	0.52	0.54	0.58	0.59	0.60	0.61	0.59	0.55	0.51	0.46	0.43	0.42	0.39	0.37		
135	0.63	0.64	0.66	0.69	0.71	0.74	0.76	0.77	0.77	0.75	0.70	0.65	0.62	0.60	0.57	0.54	0.52		
140	0.79	0.80	0.82	0.86	0.89	0.90	0.92	0.91	0.90	0.88	0.83	0.81	0.77	0.75	0.71	0.68	0.65		
145	0.95	0.96	0.97	0.99	1.03	1.06	1.05	1.04	1.03	1.01	0.99	0.96	0.93	0.88	0.85	0.84	0.80		
150	1.07	1.08	1.09	1.11	1.13	1.14	1.14	1.13	1.11	1.09	1.09	1.05	1.03	1.00	1.00	0.98	0.96		
155	1.15	1.17	1.20	1.19	1.18	1.18	1.16	1.15	1.14	1.13	1.12	1.10	1.08	1.08	1.11	1.06	1.05		
160	1.23	1.23	1.24	1.25	1.23	1.22	1.19	1.18	1.14	1.14	1.13	1.13	1.12	1.13	1.15	1.15	1.16		
165	1.22	1.23	1.24	1.25	1.26	1.25	1.22	1.19	1.17	1.15	1.13	1.14	1.14	1.13	1.14	1.16	1.17		
170	1.20	1.22	1.23	1.23	1.24	1.23	1.21	1.17	1.17	1.16	1.15	1.15	1.12	1.14	1.17	1.18	1.19		
175	1.20	1.21	1.21	1.21	1.20	1.19	1.18	1.17	1.16	1.11	1.16	1.17	1.15	1.15	1.18	1.20	1.20		
180	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	PF2010A	HZTE028-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	DPS1060	HZTE001-06	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	WY12010	HZTE004-03	Aug. 10, 2017	Aug. 09, 2018
Standard Source	D908	HZTE012-01	Aug. 20, 2017	Aug. 19, 2018
Standard source	SCL-1400	HZTE012-02	Aug. 20, 2017	Aug. 19, 2018
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 16, 2017	Aug. 15, 2018
Temperature recorder	JM624U	HZTE018-08	Aug. 17, 2017	Aug. 16, 2018

Table 6: Test Equipment List

TEST METHODS

Seasoning of SSL Product

For the purpose of rating new SSL products, SSL products shall be tested with no seasoning. Therefore, no seasoning was performed.

Goniophotometer Method

Photometric and Electrical Measurements

An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.

Ambient temperature was measured at the same height of the sample mounted on the Goniophotometer equipment. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED lamps) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 30 min, taken 15 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Everfine Digital Power Meter.

Some graphics were created with Photometric Plus software.

The standard reference of the Goniophotometer system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Metrology P.R. China.

The uncertainty of goniophotometer system reported in this document is expanded uncertainty is 2.3% with a coverage factor $k=2$.

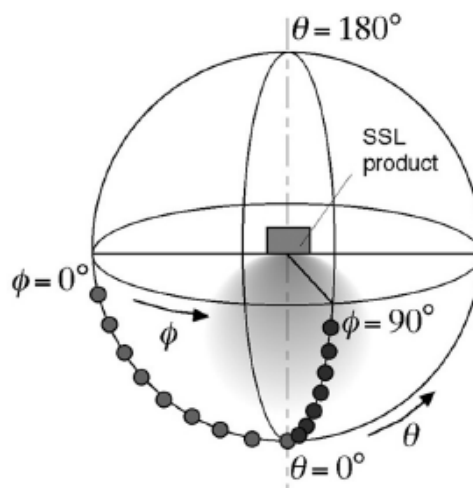
Color Characteristics Measurements

The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as values that are spatially average, weighted to intensity, over the angular range where light is intentionally emitted from the SSL product. The color characteristics measurements are using gonio-spectroradiometer.

Color Spatial Uniformity

The characteristics of SSL products may be spatially non-uniform, the chromaticity coordinate shall be measured at two vertical planes ($C=0^\circ/180^\circ$ and $C=90^\circ/270^\circ$) and at 10° or less intervals for vertical angle until the light output dropped to below 10% of the peak intensity. The averaged weighted chromaticity coordinate was calculated from these points. The data was then analyzed to check for delta color differences of the u' , v' chromaticity coordinates. The spatial non-uniformity of chromaticity, $\Delta u'v'$, is determined as the maximum deviation (distance on the CIE (u' , v') diagram) among all measured points from the spatially averaged chromaticity coordinate.

The geometry for the chromaticity measurement using gonio-spectroradiometer is shown as following.



*** End of Report ***

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