LM-79-08 Test Report

for

P.Q.L., Inc.

2285 Ward Avenue / Simi Valley, CA 93065

FLOOD light

Model: 84136

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18050002e

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: **84136**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
134.1	6621.1	49.38	0.9968

CCT (K)	CRI	Stabilization Time (Light & Power)
4048	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

TABLE OF CONTENT

Sample Photos

Overview of the sample

Equipment Under Test (EUT)	
Name	: FLOOD light
Model	: 84136
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 25.0℃.

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)	0.413	0.181
Power Factor	0.9968	0.9649
Test Power (W)	49.38	48.42
THD A%	5.87	8.16
Luminous Efficacy (lm/W)	134.1	135.7
Total Luminous Flux (lm)	6621.1	6573.5
Color Rendering Index (CRI)	71.8	
R9	-15	
Correlated Color Temperature (CCT) (K)	4048	
Chromaticity (Chroma x, Chroma y)	(0.3786, 0.3764)	
Chromaticity (Chroma u, Chroma v)	(0.2240, 0.3341)	
Chromaticity (Chroma u', Chroma v')	(0.2240, 0.5011)	
Duv	0.0004	
Average Beam Angle (°)	90.4	
Center Beam Candle Power (cd)	3270	
Spacing Criteria	0.98 (0°-180°)/ 1.20 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	96.67%	
Zonal Lumens in the 60°-90°Zone	3.24%	
Zonal Lumens in the 90°-120°Zone	0.01%	
Zonal Lumens in the 120°-180°Zone	0.08%	

Special Color Rendering Indices	
R1	70
R2	78
R3	80
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

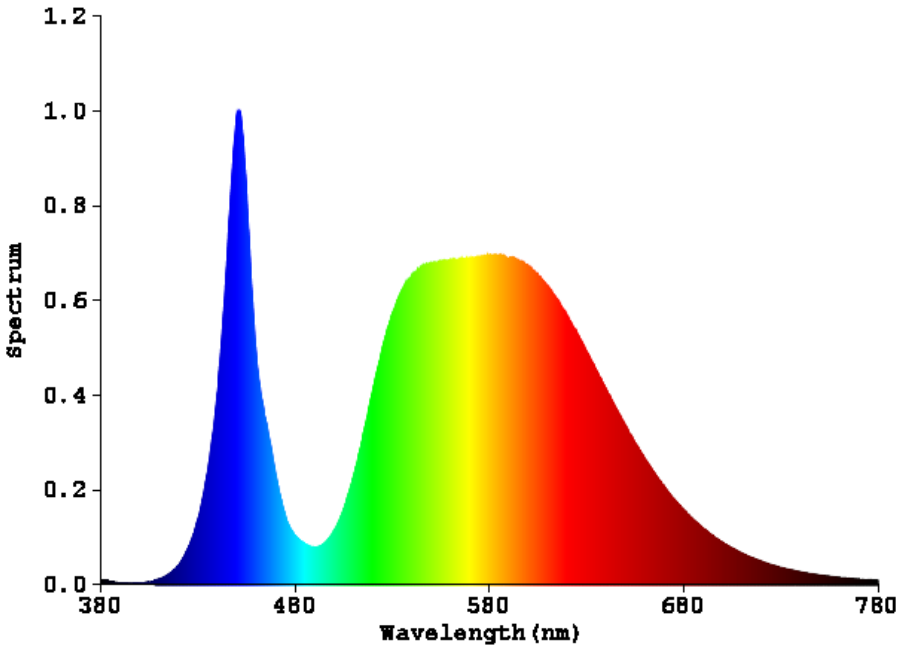


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

γ(°)	Lumens	% Total
0- 10	314.919	4.76%
10- 20	924.347	13.96%
20- 30	1380.502	20.85%
30- 40	1560.603	23.57%
40- 50	1369.2	20.68%
50- 60	851.198	12.86%
60- 70	205.611	3.11%
70- 80	8.592	0.13%
80- 90	0.085	0.00%
90-100	0.076	0.00%
100-110	0.235	0.00%
110-120	0.45	0.01%
120-130	0.747	0.01%
130-140	1.112	0.02%
140-150	1.275	0.02%
150-160	1.11	0.02%
160-170	0.746	0.01%
170-180	0.266	0.00%
Total	6621.1	100%

γ(°)	Lumens	% Total
0- 60	6400.769	96.67%
60- 90	214.288	3.24%
0-90	6615.057	99.91%
90- 180	6.017	0.09%
0- 180	6621.1	100%

Table 3: Zonal Lumen Data

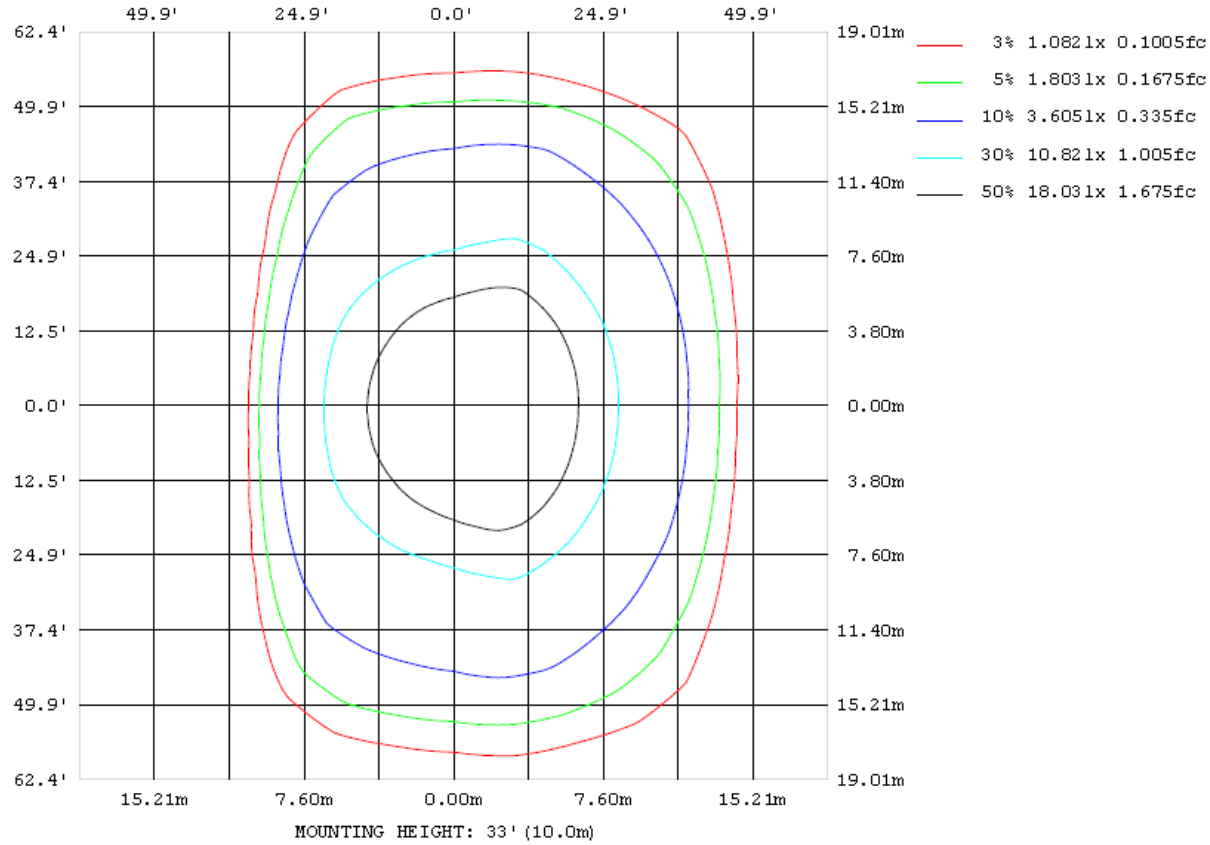


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

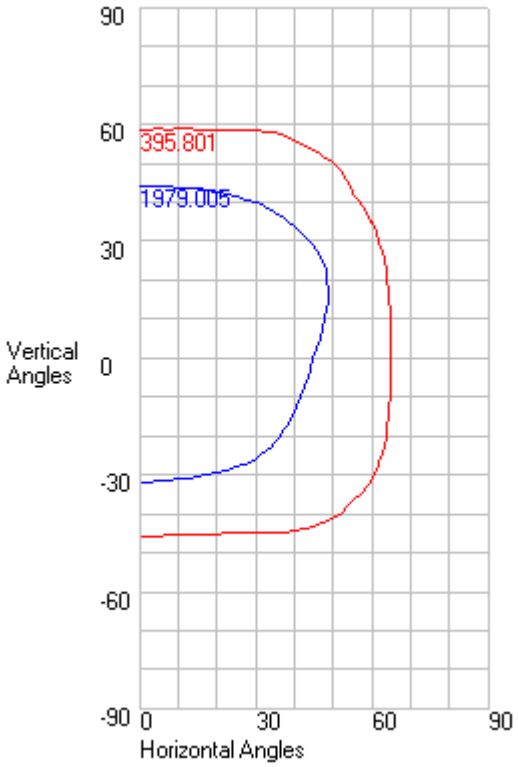


Chart 3: Isocandela Plot

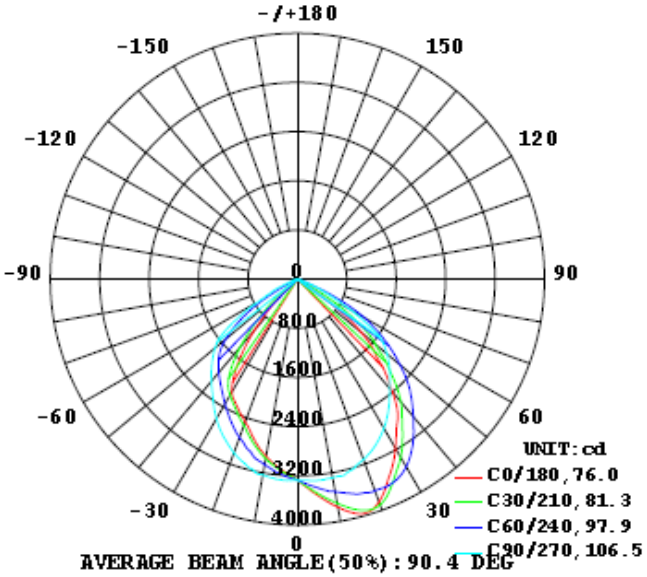


Chart 4: Polar Candela Distribution

Luminous Intensity Data

Table--1 UNIT: cd

γ (DEG) \ C(DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270
5	3515	3511	3499	3484	3460	3432	3396	3360	3323	3288	3254	3222	3193	3167	3146	3128	3116	3109	3103
10	3764	3757	3736	3703	3653	3593	3511	3432	3352	3281	3210	3149	3094	3054	3015	2985	2957	2938	2929
15	3952	3949	3930	3889	3817	3720	3620	3487	3348	3236	3136	3054	3000	2907	2842	2787	2747	2716	2702
20	3859	3870	3889	3910	3898	3818	3663	3474	3289	3124	2994	2891	2800	2730	2654	2568	2515	2486	2472
25	3526	3541	3581	3652	3736	3753	3654	3438	3193	2985	2834	2727	2624	2528	2449	2399	2351	2316	2303
30	3174	3199	3261	3344	3417	3514	3522	3322	3030	2801	2640	2528	2432	2348	2290	2230	2185	2145	2124
35	2822	2839	2876	2964	3097	3201	3260	3142	2829	2575	2412	2327	2240	2182	2121	2019	1863	1737	1690
40	2390	2425	2506	2606	2697	2844	2919	2960	2601	2331	2182	2129	2070	2008	1855	1571	1314	1141	1085
45	1851	1888	2006	2125	2308	2443	2581	2699	2385	2117	1994	1947	1901	1769	1381	990	704	509	451
50	1361	1405	1522	1651	1840	2036	2169	2412	2146	1894	1793	1750	1688	1320	807	389	143	63.6	36.0
55	609	662	840	1118	1400	1565	1719	1889	1815	1608	1546	1515	1335	780	248	47.2	11.7	4.43	1.46
60	39.3	44.1	92.9	366	776	1156	1242	1176	1114	962	945	992	779	255	22.2	6.10	3.01	1.08	0.68
65	0.60	0.69	1.69	5.82	70.6	484	587	470	466	436	424	387	178	17.8	7.09	3.57	0.31	0.28	0.28
70	0.23	0.23	0.27	0.32	5.30	21.3	124	167	131	108	98.3	97.0	16.5	8.27	0.30	0.27	0.25	0.23	0.22
75	0.09	0.10	0.11	0.14	0.20	0.38	4.29	22.3	17.1	8.04	8.91	5.46	3.36	0.24	0.22	0.19	0.17	0.16	0.16
80	0.05	0.05	0.05	0.09	0.06	0.13	0.16	0.37	1.27	0.78	0.48	0.21	0.16	0.14	0.13	0.12	0.12	0.11	0.11
85	0.03	0.03	0.03	0.03	0.04	0.06	0.06	0.06	0.09	0.12	0.12	0.11	0.08	0.08	0.09	0.09	0.09	0.09	0.09
90	0.02	0.02	0.02	0.02	0.03	0.04	0.05	0.04	0.05	0.05	0.05	0.06	0.06	0.06	0.05	0.03	0.02	0.02	0.02
95	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.06	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.05	0.03	0.02	0.02
100	0.02	0.02	0.02	0.03	0.04	0.06	0.08	0.11	0.14	0.15	0.15	0.16	0.15	0.14	0.13	0.10	0.08	0.06	0.07
105	0.02	0.02	0.03	0.05	0.08	0.11	0.14	0.19	0.23	0.26	0.27	0.26	0.26	0.24	0.21	0.18	0.15	0.12	0.18
110	0.03	0.04	0.06	0.09	0.13	0.17	0.23	0.30	0.35	0.38	0.39	0.39	0.38	0.35	0.32	0.28	0.24	0.22	0.31
115	0.07	0.08	0.11	0.15	0.20	0.28	0.33	0.42	0.48	0.52	0.54	0.53	0.51	0.49	0.46	0.42	0.38	0.35	0.47
120	0.17	0.18	0.21	0.26	0.33	0.43	0.50	0.54	0.63	0.69	0.71	0.69	0.68	0.67	0.63	0.59	0.55	0.54	0.69
125	0.31	0.34	0.37	0.42	0.49	0.60	0.68	0.71	0.83	0.90	0.91	0.90	0.89	0.87	0.84	0.79	0.78	0.78	0.97
130	0.50	0.53	0.58	0.63	0.66	0.76	0.88	0.96	1.03	1.12	1.13	1.14	1.13	1.10	1.08	1.10	1.06	1.06	1.38
135	0.73	0.78	0.82	0.85	0.89	0.98	1.08	1.22	1.26	1.38	1.41	1.41	1.38	1.38	1.41	1.41	1.38	1.40	1.86
140	0.93	0.98	1.00	1.07	1.13	1.25	1.32	1.41	1.51	1.57	1.62	1.65	1.65	1.68	1.68	1.65	1.65	1.68	2.29
145	1.14	1.19	1.24	1.26	1.35	1.43	1.56	1.64	1.78	1.83	1.88	1.91	1.90	1.87	1.86	1.85	1.90	1.90	2.69
150	1.40	1.45	1.51	1.54	1.53	1.59	1.66	1.80	1.87	1.92	2.00	2.01	1.99	2.00	2.02	2.02	2.09	2.05	2.95
155	1.68	1.75	1.79	1.84	1.76	1.75	1.80	1.88	1.94	1.93	2.04	2.08	2.09	2.12	2.17	2.26	2.26	2.22	3.07
160	1.97	2.02	2.04	2.07	2.03	1.96	1.92	1.98	2.01	1.95	2.15	2.22	2.24	2.29	2.37	2.41	2.39	2.40	3.18
165	2.12	2.19	2.25	2.27	2.29	2.20	2.18	2.18	2.15	2.16	2.31	2.39	2.40	2.44	2.49	2.48	2.50	2.48	3.06
170	2.40	2.43	2.50	2.53	2.50	2.38	2.34	2.31	2.40	2.38	2.41	2.55	2.55	2.56	2.58	2.61	2.63	2.61	2.93
175	2.75	2.78	2.82	2.83	2.82	2.72	2.67	2.67	2.63	2.53	2.71	2.79	2.79	2.81	2.87	2.90	2.91	2.89	2.89
180	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78

Table 4: Luminous Intensity Data

Table--2 UNIT: cd

γ (DEG) \ C(DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270	3270		
5	3106	3114	3123	3137	3158	3181	3208	3239	3273	3309	3344	3382	3417	3454	3478	3498	3510		
10	2930	2943	2966	2987	3020	3066	3112	3170	3234	3303	3381	3466	3541	3614	3680	3726	3753		
15	2703	2728	2762	2809	2880	2915	2986	3056	3150	3262	3397	3524	3666	3770	3852	3911	3942		
20	2472	2491	2536	2599	2668	2742	2814	2891	3006	3160	3348	3540	3713	3844	3892	3884	3877		
25	2300	2319	2351	2392	2459	2552	2638	2719	2829	3007	3255	3497	3670	3684	3645	3577	3542		
30	2125	2154	2178	2219	2270	2345	2441	2520	2624	2824	3104	3369	3424	3362	3298	3242	3198		
35	1704	1795	1931	2048	2101	2152	2222	2293	2387	2608	2911	3148	3086	3028	2936	2862	2836		
40	1107	1229	1440	1711	1922	1985	2027	2081	2165	2395	2711	2816	2739	2642	2576	2497	2430		
45	478	606	845	1189	1577	1801	1850	1892	1961	2185	2537	2531	2362	2261	2108	2001	1912		
50	42.6	96.3	269	605	1073	1510	1640	1684	1742	1946	2219	2089	1945	1798	1640	1525	1419		
55	2.66	7.76	23.1	107	527	1073	1373	1364	1375	1517	1679	1586	1492	1369	1145	875	693		
60	0.91	2.80	5.44	12.2	61.4	483	776	748	739	839	923	1022	1092	812	425	160	39.4		
65	0.28	0.29	0.34	7.91	11.8	47.8	272	362	386	409	379	391	405	158	14.2	3.40	1.32		
70	0.22	0.23	0.26	0.28	0.53	15.8	49.7	76.1	69.0	106	102	104	36.3	11.8	0.29	0.26	0.23		
75	0.16	0.16	0.18	0.19	0.21	0.22	2.03	6.09	6.81	7.92	20.4	2.37	0.21	0.17	0.13	0.11	0.10		
80	0.11	0.11	0.12	0.12	0.12	0.13	0.16	0.19	0.25	0.66	0.17	0.11	0.07	0.05	0.05	0.05	0.04		
85	0.09	0.09	0.09	0.08	0.08	0.07	0.07	0.07	0.08	0.07	0.04	0.03	0.02	0.02	0.02	0.02	0.02		
90	0.01	0.01	0.02	0.04	0.05	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.02	0.02	0.02	0.02	0.02		
95	0.03	0.04	0.06	0.10	0.13	0.15	0.16	0.15	0.14	0.13	0.12	0.09	0.06	0.03	0.02	0.01	0.01		
100	0.08	0.11	0.16	0.21	0.26	0.29	0.31	0.30	0.28	0.26	0.22	0.18	0.12	0.07	0.03	0.02	0.02		
105	0.19	0.23	0.30	0.36	0.43	0.47	0.49	0.48	0.45	0.41	0.36	0.30	0.22	0.14	0.07	0.03	0.02		
110	0.33	0.37	0.44	0.52	0.59	0.64	0.66	0.66	0.62	0.57	0.49	0.41	0.32	0.22	0.14	0.08	0.05		
115	0.49	0.54	0.61	0.68	0.74	0.79	0.81	0.80	0.77	0.70	0.61	0.52	0.42	0.33	0.24	0.17	0.13		
120	0.71	0.75	0.81	0.88	0.94	0.98	0.98	0.97	0.94	0.86	0.76	0.66	0.57	0.48	0.39	0.31	0.26		
125	0.99	1.03	1.07	1.14	1.21	1.25	1.25	1.24	1.20	1.11	0.99	0.86	0.76	0.67	0.59	0.52	0.46		
130	1.40	1.43	1.50	1.54	1.59	1.65	1.64	1.62	1.57	1.46	1.32	1.15	1.04	0.95	0.90	0.82	0.74		
135	1.90	1.92	1.98	2.05	2.06	2.06	2.05	2.04	1.99	1.86	1.68	1.51	1.40	1.33	1.23	1.16	1.08		
140	2.34	2.37	2.42	2.50	2.51	2.48	2.45	2.40	2.33	2.21	2.02	1.89	1.77	1.67	1.55	1.48	1.39		
145	2.72	2.80	2.79	2.82	2.84	2.84	2.79	2.71	2.66	2.52	2.40	2.28	2.14	1.99	1.90	1.85	1.73		
150	2.97	3.03	3.03	3.03	3.02	3.00	2.97	2.90	2.78	2.73	2.67	2.50	2.42	2.29	2.28	2.21	2.10		
155	3.07	3.14	3.23	3.16	3.09	3.04	2.99	2.92	2.86	2.82	2.73	2.66	2.57	2.55	2.59	2.43	2.34		
160	3.19	3.17	3.23	3.25	3.19	3.11	3.03	2.99	2.85	2.85	2.81	2.79	2.73	2.74	2.77	2.73	2.68		
165	3.09	3.12	3.13	3.16	3.19	3.14	3.08	2.99	2.92	2.86	2.85	2.86	2.83	2.82	2.82	2.85	2.80		
170	2.96	3.02	3.06	3.07	3.07	3.04	3.00	2.92	2.89	2.88	2.89	2.88	2.80	2.88	2.95	2.98	2.92		
175	2.91	2.94	2.97	3.00	2.95	2.94	2.92	2.88	2.83	2.77	2.91	2.93	2.87	2.94	3.05	3.06	3.07		
180	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78		

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

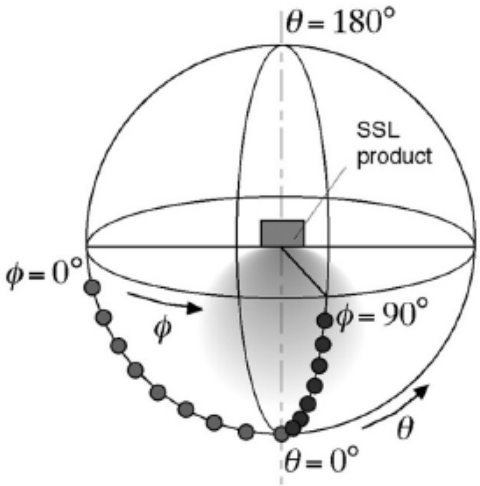
An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.
Ambient temperature was measured 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 expended 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°/180° and C=90°/270°) 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, Δu'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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