



LM-79-08 Test Report

for

P.Q.L., Inc.

2285 Ward Avenue / Simi Valley, CA 93065

FLOOD Light

Model: 84142

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ18070026a

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

Review by:

Engineer: April Zou
Sep. 03, 2018

Approved by

Manager: Jim Zhang
Sep. 03, 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: **84142**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
123.8	26030.0	210.35	0.9981
CCT (K)	CRI	Stabilization Time (Light & Power)	
3939	75.1	60	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Jul. 17, 2018
Date of Test	: Aug. 24, 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	: 84142
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 24.6°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)	1.757	0.761
Power Factor	0.9981	0.9643
Test Power (W)	210.35	203.37
THD A%	3.87	4.82
Luminous Efficacy (lm/W)	123.8	128.2
Total Luminous Flux (lm)	26030.0	26063.0
Color Rendering Index (CRI)	75.1	
R9	-28	
Correlated Color Temperature (CCT) (K)	3939	
Chromaticity (Chroma x, Chroma y)	(0.3852, 0.3857)	
Chromaticity (Chroma u, Chroma v)	(0.2247, 0.3375)	
Chromaticity (Chroma u', Chroma v')	(0.2247, 0.5062)	
Duv	0.0028	
Average Beam Angle (°)	98.2	
Center Beam Candle Power (cd)	12030	
Spacing Criteria	1.18 (0°-180°)/ 1.23 (90°-270°)	
Zonal Lumens in the 0°-60° Zone	93.95%	
Zonal Lumens in the 60°-90° Zone	6.05%	
Zonal Lumens in the 90°-120° Zone	0.00%	
Zonal Lumens in the 120°-180° Zone	0.00%	

Special Color Rendering Indices	
R1	71
R2	83
R3	92
R4	73
R5	72
R6	76
R7	82
R8	52
R9	-28
R10	60
R11	70
R12	50
R13	74
R14	96

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

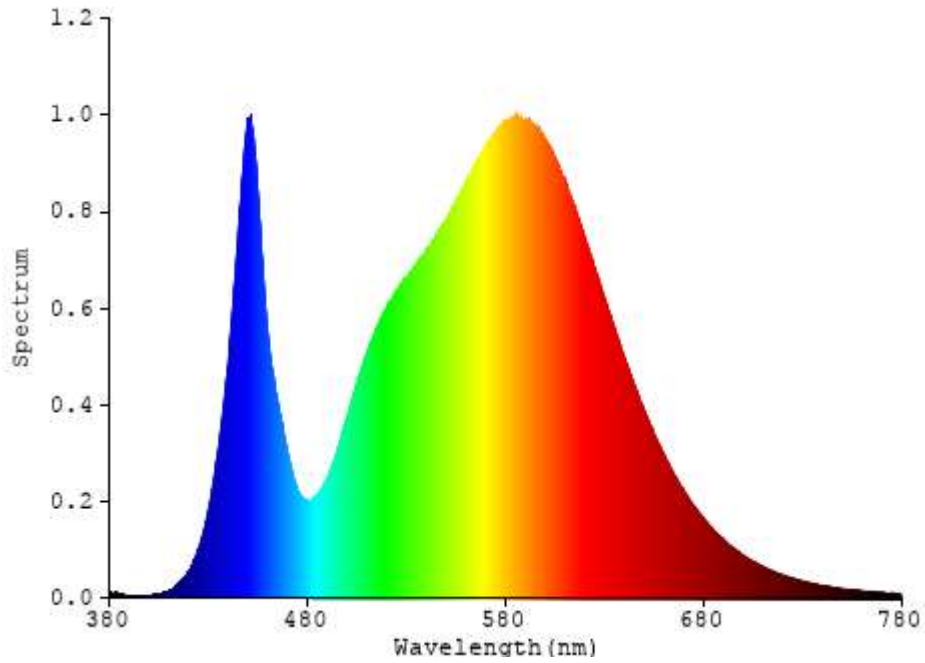


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	1149.347	4.42%
10- 20	3290.103	12.64%
20- 30	4912.388	18.87%
30- 40	5837.261	22.42%
40- 50	5548.643	21.32%
50- 60	3718.428	14.28%
60- 70	1402.1	5.39%
70- 80	162.651	0.62%
80- 90	9.469	0.04%
Total	26030.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	24456.17	93.95%
60- 90	1574.22	6.05%
0-90	26030.39	100.00%
90- 180	0	0.00%
0- 180	26030.4	100%

Table 3: Zonal Lumen Data

Note: The Flux in this table might be a little different from the total flux in Table 2 due to rounding.

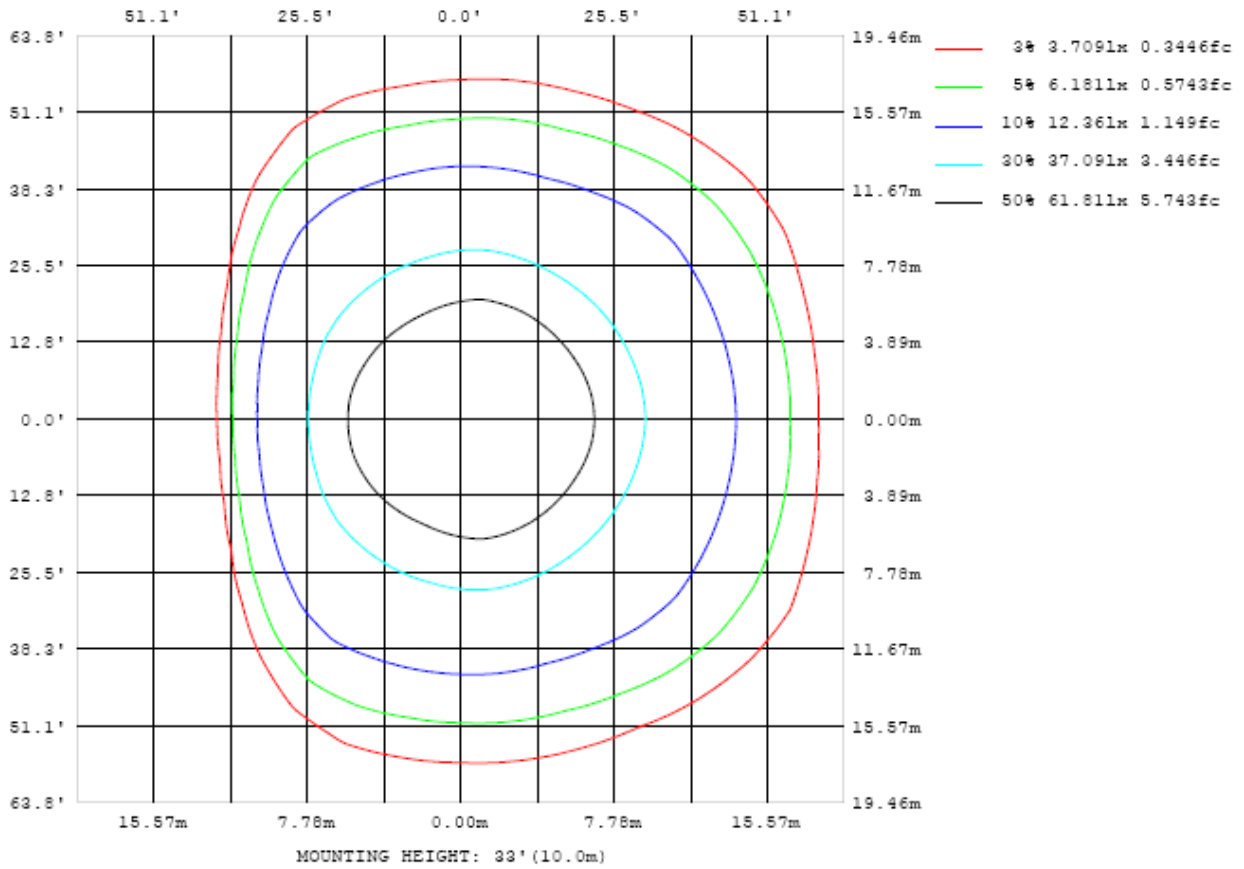


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

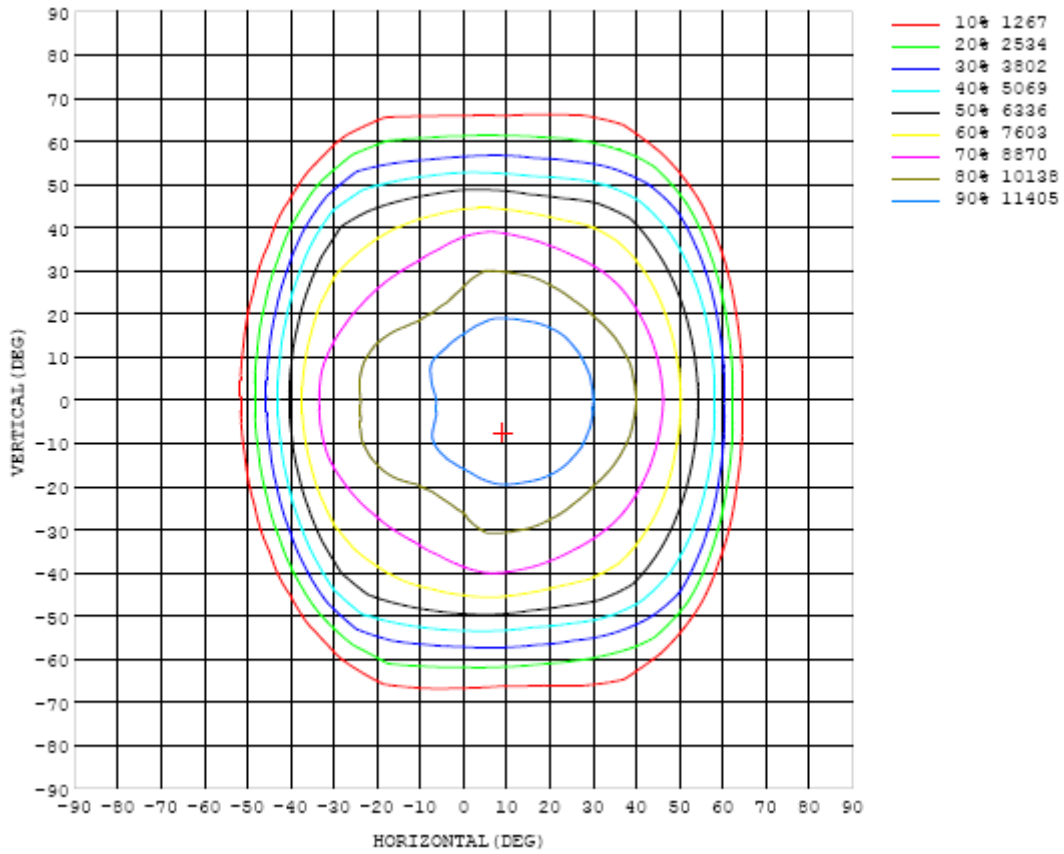


Chart 3: Isocandela Plot

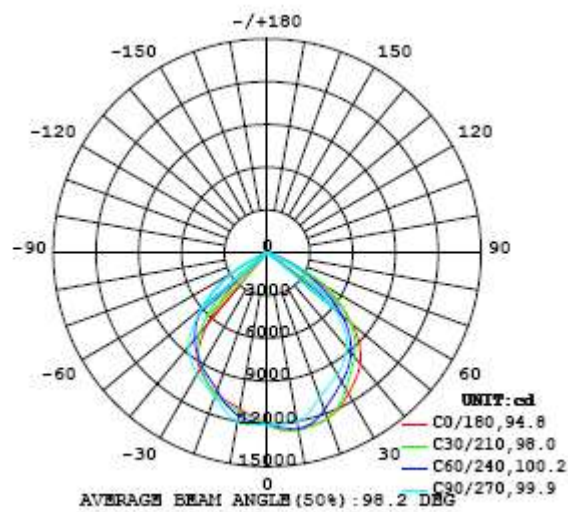


Chart 4: Polar Candela Distribution

Luminous Intensity Data

Table--1 UNIT: *10cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203
5	1250	1249	1247	1244	1241	1238	1230	1222	1213	1205	1196	1187	1178	1171	1163	1158	1154	1152	1153
10	1257	1259	1260	1261	1264	1263	1255	1239	1221	1204	1188	1172	1159	1148	1136	1124	1115	1111	1110
15	1246	1248	1251	1257	1255	1246	1232	1210	1181	1155	1135	1124	1117	1111	1105	1099	1089	1082	1081
20	1234	1237	1245	1237	1217	1194	1172	1144	1113	1079	1057	1046	1043	1057	1068	1071	1065	1054	1051
25	1199	1200	1202	1182	1156	1126	1105	1091	1062	1026	999	984	981	995	1007	1015	1017	1005	1001
30	1141	1139	1127	1104	1082	1066	1046	1039	1023	987	957	934	930	931	933	938	945	946	943
35	1081	1075	1051	1022	1006	997	989	979	970	935	904	882	871	862	859	861	859	850	846
40	1013	1001	977	952	932	920	915	904	896	867	835	820	802	789	777	734	689	657	650
45	917	900	885	871	857	837	817	803	791	766	743	735	720	702	632	542	467	421	412
50	769	762	768	766	765	740	686	650	635	617	606	606	612	557	435	317	235	193	187
55	609	609	616	627	639	595	529	484	465	449	446	453	452	355	218	114	71.6	61.9	61.7
60	407	429	461	475	461	417	361	334	319	306	306	309	264	153	61.9	36.2	27.1	26.7	27.0
65	108	124	175	253	279	247	220	186	169	170	178	186	110	39.5	20.4	18.7	20.1	20.3	20.6
70	33.4	34.9	36.7	45.8	78.3	128	106	73.4	54.6	57.0	60.4	58.0	26.9	18.1	13.8	11.7	11.9	11.7	11.8
75	6.36	6.33	6.97	11.8	15.3	19.5	32.6	18.8	15.2	17.2	14.2	9.22	11.0	10.9	7.13	4.84	3.73	2.89	2.91
80	1.87	1.94	2.07	2.42	2.91	4.52	5.09	5.44	8.07	7.44	4.73	3.21	3.50	1.73	1.07	0.92	0.98	0.92	0.93
85	0.02	0.02	0.02	0.07	0.31	0.63	0.78	1.34	2.54	2.01	0.91	0.59	0.27	0.23	0.19	0.14	0.11	0.09	0.09
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 4: Luminous Intensity Data

Table--2 UNIT: ×10cd

C (DEG) y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203	1203		
5	1154	1158	1164	1171	1179	1187	1194	1203	1213	1221	1230	1238	1244	1248	1251	1251	1250		
10	1113	1123	1131	1141	1152	1161	1171	1184	1201	1220	1240	1256	1264	1266	1267	1264	1259		
15	1087	1094	1100	1101	1100	1104	1109	1123	1146	1177	1204	1225	1238	1249	1254	1253	1249		
20	1059	1067	1061	1051	1034	1028	1033	1049	1076	1110	1140	1162	1185	1211	1229	1240	1239		
25	1008	1009	999	986	974	968	974	995	1024	1061	1082	1096	1120	1149	1176	1194	1198		
30	944	932	920	914	914	918	927	951	983	1018	1029	1039	1056	1075	1099	1122	1137		
35	847	849	845	845	850	858	870	892	927	958	964	978	985	997	1019	1049	1072		
40	662	693	740	770	777	789	802	823	855	879	882	892	904	924	947	975	1002		
45	430	482	560	644	693	703	710	720	742	757	769	790	818	845	862	880	903		
50	202	252	340	460	565	581	578	580	594	605	616	660	723	747	753	755	761		
55	64.0	77.1	135	247	371	443	428	417	425	443	466	514	576	619	607	603	605		
60	26.7	27.9	40.2	71.4	177	270	293	283	287	303	319	351	409	446	455	438	416		
65	20.2	19.6	18.5	22.6	46.3	124	172	155	151	162	188	221	242	259	212	153	117		
70	11.8	11.8	11.7	14.8	18.8	29.3	50.9	42.6	42.0	43.6	71.7	104	108	55.3	38.0	35.7	35.0		
75	2.96	3.86	4.30	7.40	10.7	9.70	8.62	11.7	17.1	13.3	19.4	24.1	17.4	15.4	10.4	6.63	5.21		
80	0.94	0.92	0.87	0.99	1.98	3.20	2.89	5.20	7.15	7.01	4.18	4.68	3.60	2.59	2.36	2.02	1.89		
85	0.09	0.10	0.13	0.16	0.18	0.24	0.47	0.95	1.49	1.80	0.81	0.54	0.10	0.03	0.02	0.02	0.02		
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 14, 2018	Aug. 13, 2019
Digital Power Meter	WT210	HZTE028-01	Aug. 16, 2018	Aug. 15, 2019
AC Power Supply	DPS1060	HZTE001-06	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	WY12010	HZTE004-03	Aug. 09, 2018	Aug. 08, 2019
Standard Source	D908	HZTE012-01	Aug. 14, 2018	Aug. 13, 2019
Standard source	SCL-1400	HZTE012-02	Aug. 16, 2018	Aug. 15, 2019
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 09, 2018	Aug. 08, 2019
Temperature recorder	JM624U	HZTE018-08	Aug. 09, 2018	Aug. 08, 2019

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 $k=2$.

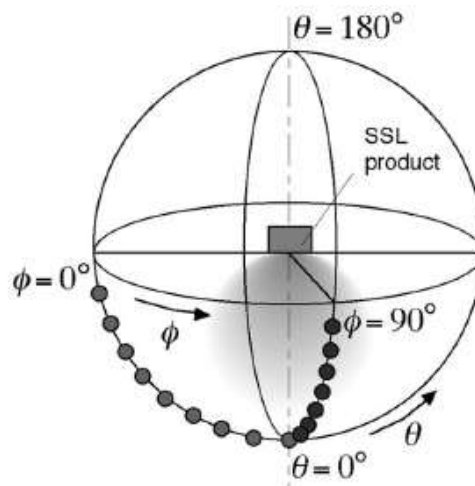
Color Characteristics Measurements

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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