

**TEST REPORT**

**IES LM 79-08**

**PHOTOMETRIC & ELECTRICAL MEASUREMENT**

Sample Tested:

**Indoor LED Downlight Retrofit Kit**

Model:

**9145X, 91454, 91455, 91456**

Applicant:

**P.Q.L., Inc.**

Technical Report Number:

**265072-70098585-14-01**

Report Date:

**2017-9-25**

Prepared by:



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Approved by:



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Technical Lab Manager

## Table of Contents

1. IES LM 79-08 Testing Report	Page 3
2. Product Description	Page 4
3. Photometric Test Result	Page 5
4. Spectral Flux	Page 6
5. Intensity Distribution Diagram	Page 7
6. Flux Distribution – Zonal Lumen Summary	Page 8
7. Isocandela Diagram	Page 9
8. Planar illuminance curve	Page 10
9. Luminous distribution intensity data	Page 11-14
10. Photometric Testing Information	Page 15
11. Equipment List	Page 16

## IES LM 79-08 Testing Report:

### Laboratory Information

Name of test lab	CSA Group (Shanghai)
Date of test report	2017-9-25
Test report number	265072-70098585-14-01
Laboratory contact name	Alex Song
Laboratory contact signature*	<i>Alex Song</i>

\* By signing this form, the signatory is attesting that the information on the form is correct and the same as on the original, complete test report(s). The signatory also attests that all of the results on this form were measured entirely in accordance with IES LM-79-08.

### Product Information

Applicant	P.Q.L., Inc.	
Manufacturer	P.Q.L., Inc.	
Brand name	Superior Life®	
SKU (if available)	N/A	
Model number	9145X, 91454, 91455, 91456	
Type of luminaire (for integral lamps, list base type and lamp type)	Indoor LED Downlight Retrofit Kit	
Luminaire aperture (downlights)	10	in.
Luminaire length	N/A	in.
Luminaire width	N/A	in.
Number of units (modular products)	N/A	

### Electrical Measurements

**120V**

Input wattage	29.293	W
Input current	0.2454	A
Input voltage (AC)	120.09	V
Power factor	0.9942	
Off-state power	0	W
THD A%	7.18	%

### Photometric Characteristics

Total initial lumen output	2872.8	lm
Initial luminaire efficacy	98.07	lm/W
Correlated color temperature / CCT	2660	K
Color rendering index / CRI	82.2	
R <sub>9</sub> value	8	
Duv	0.00034	

### Luminous Intensity Distribution

Center beam candlepower (if applicable)	6400	cd
Beam angle (if applicable)	34.6	°
Zonal lumens in the 0°-60° zone	99.79	%
Zonal lumens in the 60°-90° zone	0.21	%
Zonal lumens in the 90°-120° zone	0.00	%
Zonal lumens in the 120°-180° zone	0.00	%

### Product Description

The following Products were submitted for evaluation:

Indoor LED Downlight Retrofit Kit

Applicant: P.Q.L., Inc.

Manufacturer: P.Q.L., Inc.

Model No: 9145X, 91454, 91455, 91456

Input Rating: 100-277V, 50/60Hz, 0.25A, 30W

LED Driver Manufacturer: P.Q.L., Inc.

Ltd. LED Driver Model: 914426

LED Chip Manufacturer: Seoul Semiconductor Co., Ltd.

LED Chip Model: 3030B (SAWxC22B-NZ)

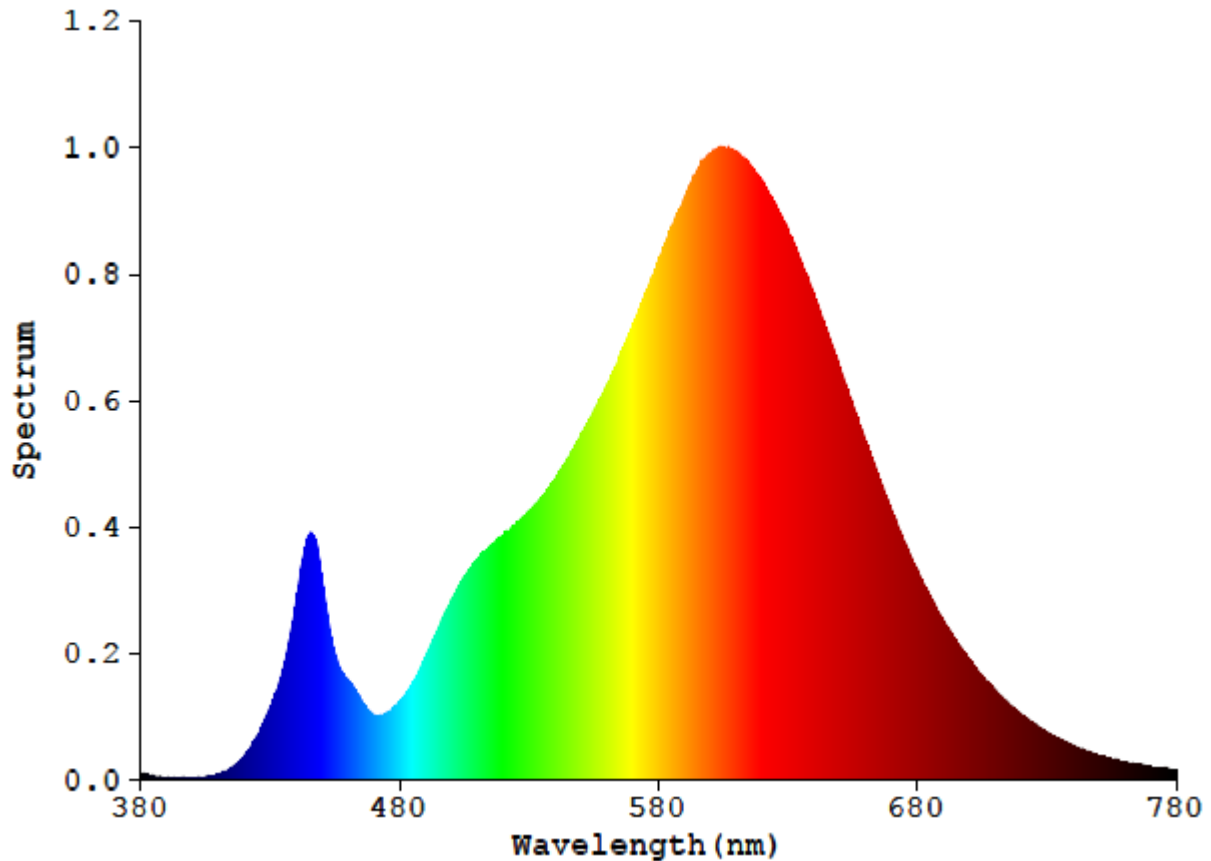
Note: Testing can, "Lithonia Lighting", Part No.: CJ00212 was used for test.



<b>Photometric Test Result:</b>	
The following results were measured after stabilization of the sample in the <b>Goniophotometer</b> (unless otherwise stated). Stability is reached when the variation of 3 readings of light output and electrical power, taken 15 minutes apart, is less than 0.50% (in accordance with IES LM 79-08).	
<b>Key Photometric Results</b>	<b>P.Q.L., Inc.</b>
	<b>9145X, 9145A, 91455, 91546</b>
Luminous Efficacy (Lumens/Watt)	<b>98.07</b>
Total Luminous Flux (Lumens)	<b>2872.8</b>
Total Radiant Flux (Watts)	<b>/</b>
Correlated Color Temperature (CCT)	<b>2660</b>
Color Rendering Index (CRI)-Ra	<b>82.2</b>
R9 Value	<b>8</b>
Chromaticity (Chroma x / Chroma y)	<b>0.4638 / 0.4123</b>
Chromaticity (Chroma u / Chroma v)	<b>0.2642 / 0.3524</b>
Chromaticity (Chroma u' / Chroma v')	<b>0.2642 / 0.5286</b>
D <sub>uv</sub> Value	<b>0.00034</b>
Stabilization Time (Light and Power)	<b>Approx. 60 minutes</b>
Total Run Time – Goniophotometer	<b>100 minutes</b>
Spacing Criteria	<b>0.55 (0° – 180°) / 0.59 (90° – 270°)</b>
<b>Electrical Input Results:</b>	
Input Power (Watts)	<b>29.293</b>
Input Voltage (Volts AC)	<b>120.09</b>
Input Current (Amps)	<b>0.2454</b>
Input Frequency (Hertz)	<b>60.0</b>
Power Factor	<b>0.9942</b>
Total Harmonic Distortion (THDi)	<b>7.18%</b>
<b>Additional Information</b>	
Ambient Temperature	<b>25.0°C</b>
Integrating Sphere Detector	<b>Everfine HAAS-2000 Spectroradiometer</b>
Absorption Correction used?	<b>No</b>

**Test Results – Spectral Flux**

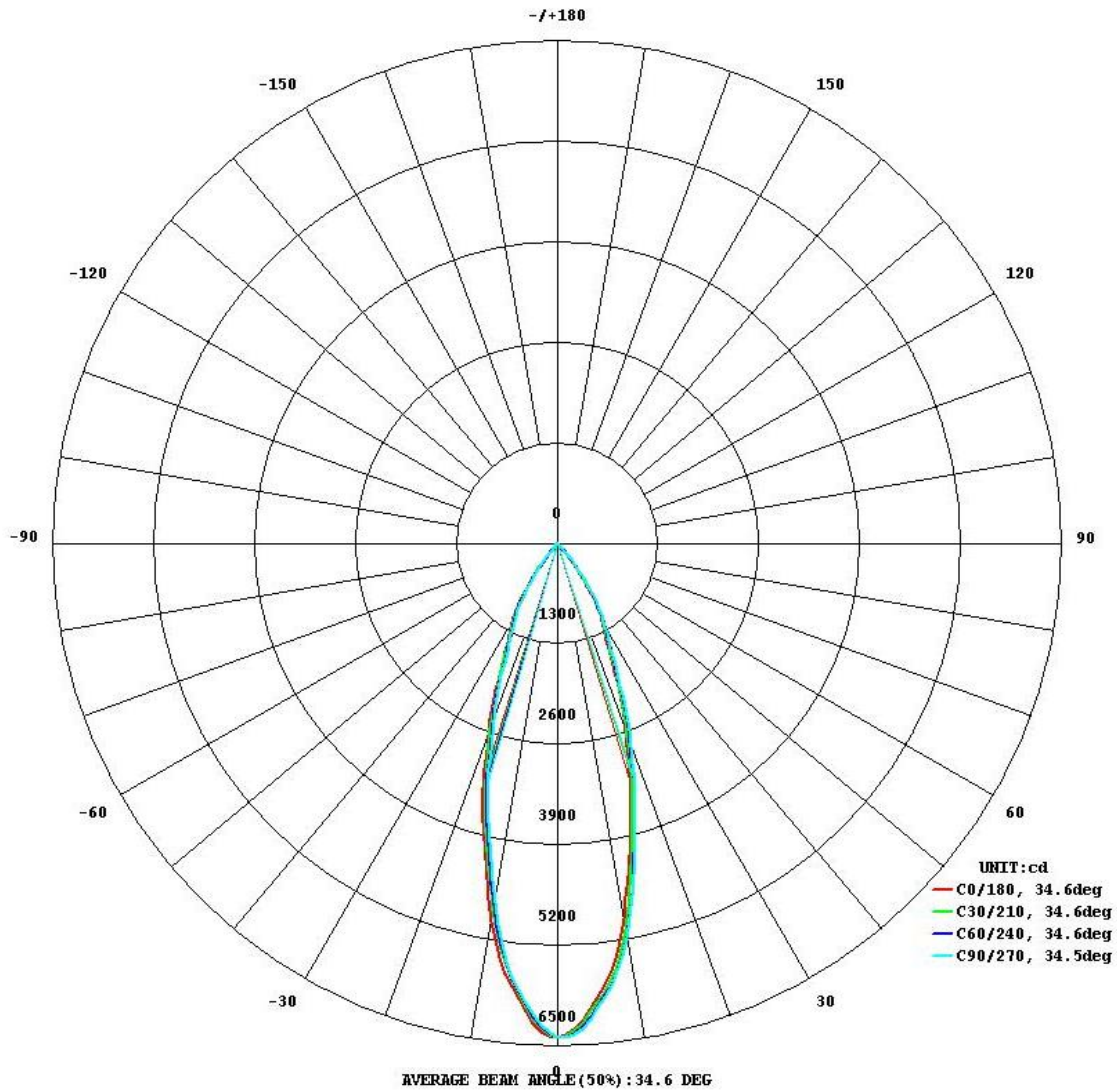
The following graph shows the spectral response curve of the radiant flux.



**Spectral response of the Radiant Flux**  
(380nm to 780nm – calibrated range of the Spectroradiometer).

**Test Results – Intensity Distribution Diagram**

The following images depict the luminous intensity distribution characteristics



Intensity Distribution Diagram

**Test Results – Flux Distribution – Zonal Lumen Summary**

The following table depicts the zonal lumen distribution.

<b>Zone</b>	<b>Lumens</b>	<b>% Total</b>
<b>0 - 10</b>	<b>534.8</b>	<b>18.62%</b>
<b>10 - 20</b>	<b>1021</b>	<b>35.54%</b>
<b>20 - 30</b>	<b>797</b>	<b>27.74%</b>
<b>30 - 40</b>	<b>436</b>	<b>15.18%</b>
<b>40 - 50</b>	<b>70.07</b>	<b>2.44%</b>
<b>50 - 60</b>	<b>8.032</b>	<b>0.28%</b>
<b>60 - 70</b>	<b>3.358</b>	<b>0.12%</b>
<b>70 - 80</b>	<b>1.863</b>	<b>0.06%</b>
<b>80 - 90</b>	<b>0.6192</b>	<b>0.02%</b>
<b>Total</b>	<b>2872.8 Lumens</b>	<b>100.00 %</b>

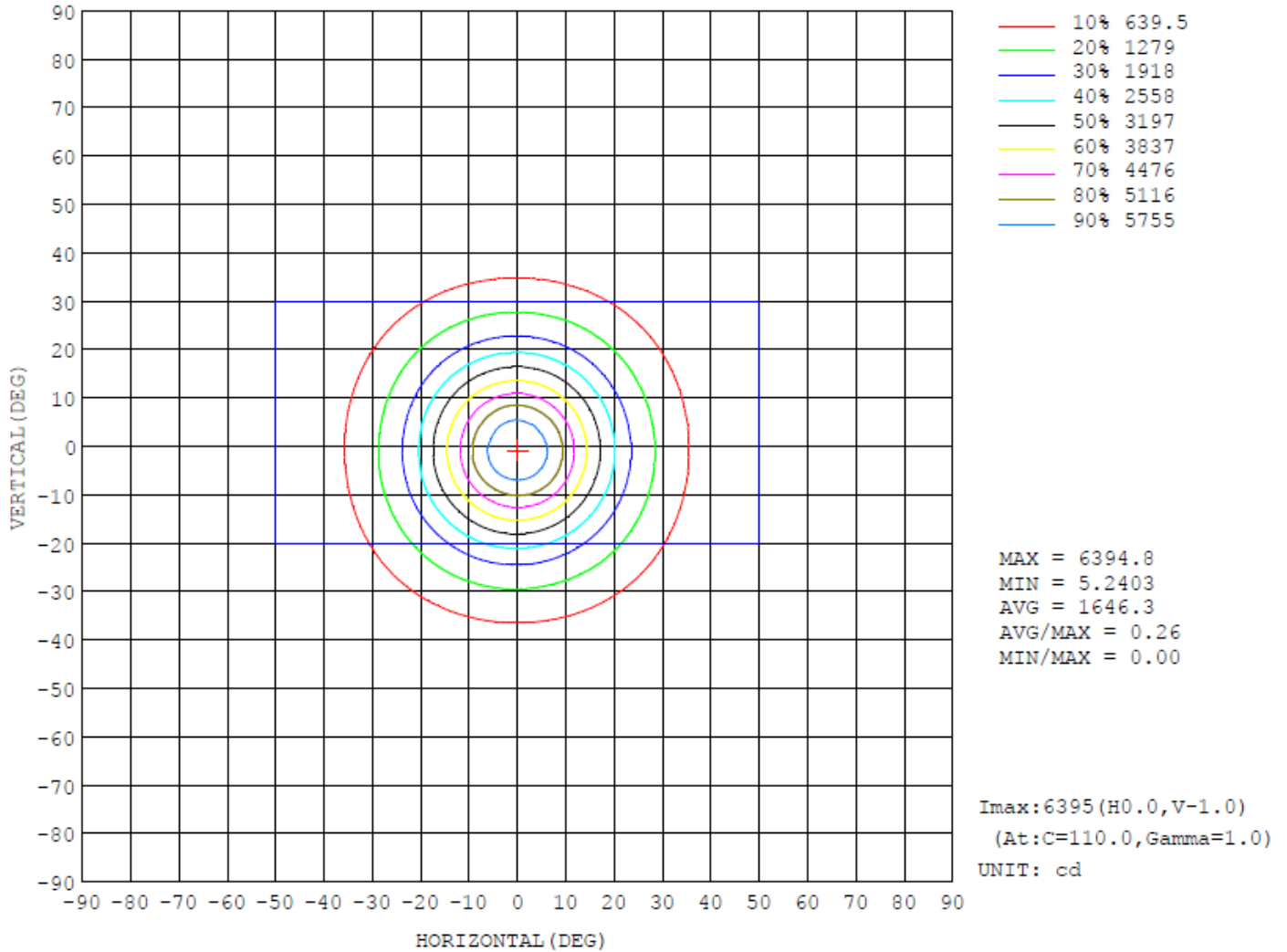
**Zonal Lumen Summary**

<b>Zone</b>	<b>Lumens</b>	<b>% Lamp / Luminaire</b>
<b>0 - 60</b>	<b>2866.9</b>	<b>99.79%</b>
<b>60 - 90</b>	<b>5.84</b>	<b>0.21%</b>
<b>0 - 90</b>	<b>2872.8</b>	<b>100.00%</b>
<b>90 - 180</b>	<b>0.0466</b>	<b>0.00%</b>
<b>0 - 180</b>	<b>2872.8</b>	<b>100.00%</b>



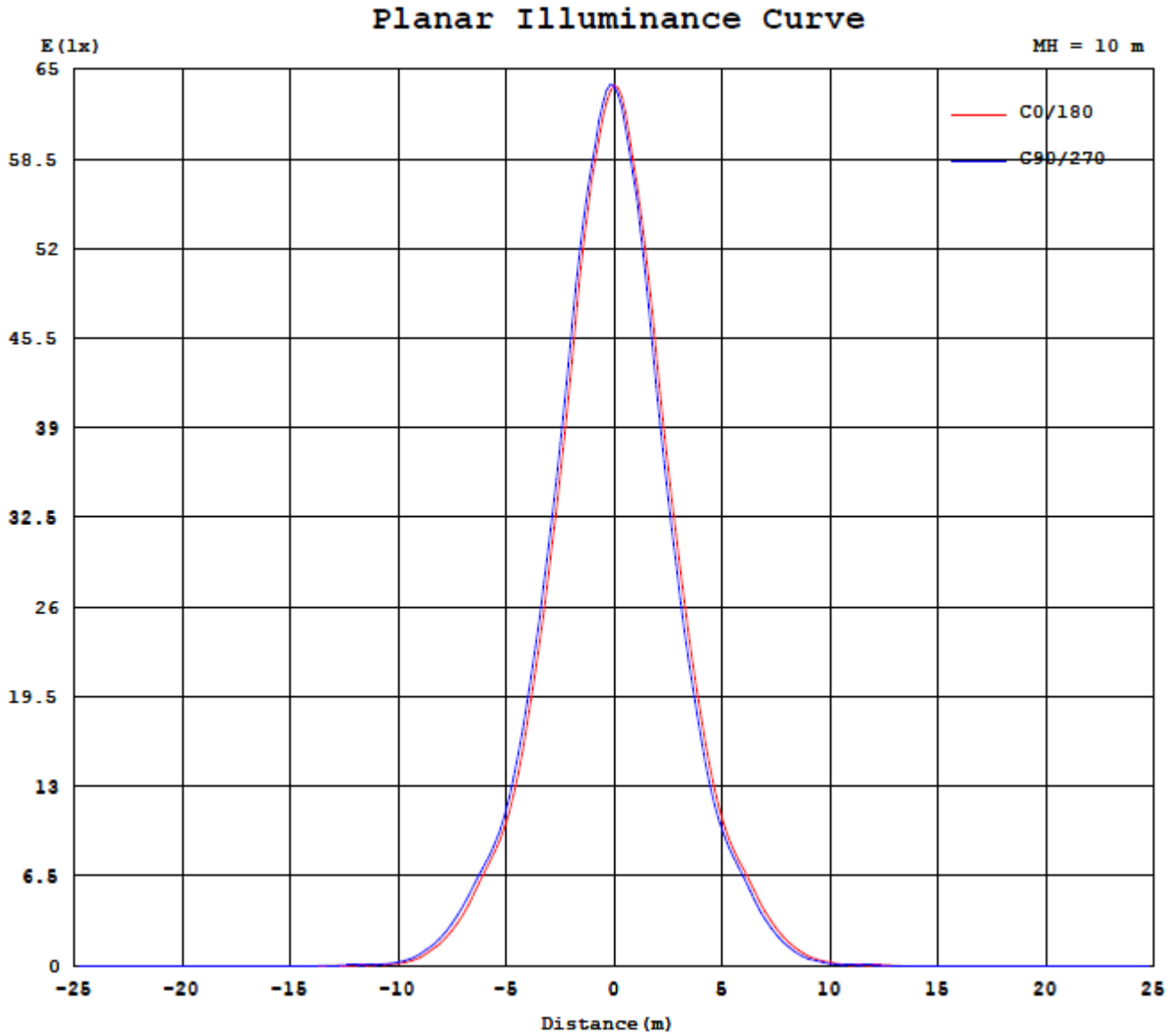
**Test Results – Isocandela Diagram**

The following images depict the isocandela diagram characteristics



**Test Results – Planar illuminance curve**

The following images depict the planar illuminance curve characteristics



**Test Results – Luminous distribution intensity data-1**

 C range: 0-360 DEG C, Interval: 5.0 DEG,  $\gamma$  range: 0-180 DEG,  $\gamma$  Interval: 5.0 DEG

C (DEG) \ $\gamma$ (DEG)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379
5	5915	5921	5930	5934	5941	5948	5951	5962	5970	5975	5985	5991	5994	5997	6004	6013	6015	6019	6020
10	4930	4954	4978	5005	5022	5046	5071	5093	5110	5127	5140	5150	5159	5169	5179	5180	5179	5182	5173
15	3676	3690	3708	3722	3737	3754	3773	3796	3820	3841	3856	3867	3881	3893	3899	3902	3906	3909	3913
20	2587	2603	2617	2630	2645	2664	2655	2680	2695	2705	2717	2724	2737	2749	2761	2768	2777	2787	2793
25	1663	1675	1688	1697	1710	1722	1734	1743	1752	1764	1771	1781	1793	1799	1804	1815	1821	1829	1835
30	1162	1167	1174	1180	1186	1191	1196	1201	1206	1213	1217	1220	1222	1225	1227	1231	1234	1236	1239
35	681	689	698	705	713	721	730	739	747	755	761	768	774	780	785	787	790	794	796
40	276	277	283	287	292	296	300	305	309	314	317	322	325	329	331	333	335	337	338
45	51.4	52.7	54.3	55.8	57.4	59.3	61.3	63.0	64.5	66.4	68.5	69.6	71.4	72.7	73.8	75.0	75.7	76.5	76.8
50	21.2	21.5	21.9	22.2	22.6	23.0	23.4	23.8	24.2	24.5	24.2	24.4	24.5	24.5	24.6	24.5	24.5	24.4	24.3
55	6.16	6.30	6.45	6.64	6.84	7.04	7.23	7.42	7.58	7.65	7.67	7.64	7.59	7.52	7.42	7.33	7.23	7.14	7.05
60	4.40	4.50	4.60	4.74	4.90	5.04	5.19	5.33	5.44	5.50	5.52	5.51	5.47	5.41	5.36	5.31	5.25	5.21	5.16
65	3.15	3.22	3.31	3.39	3.50	3.61	3.72	3.83	3.92	3.97	3.99	3.98	3.97	3.94	3.91	3.88	3.85	3.81	3.78
70	2.27	2.32	2.38	2.45	2.52	2.60	2.68	2.76	2.84	2.88	2.90	2.90	2.90	2.88	2.87	2.83	2.81	2.80	2.78
75	1.61	1.65	1.70	1.75	1.80	1.86	1.90	1.95	2.00	2.03	2.05	2.05	2.05	2.05	2.04	2.04	2.03	2.03	2.02
80	1.04	1.06	1.09	1.12	1.15	1.19	1.22	1.25	1.28	1.31	1.32	1.32	1.33	1.33	1.34	1.34	1.34	1.34	1.35
85	0.44	0.46	0.49	0.52	0.54	0.57	0.60	0.62	0.65	0.67	0.68	0.69	0.69	0.70	0.71	0.71	0.71	0.71	0.71
90	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.05
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	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
135	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
140	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
145	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02
150	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
155	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
160	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
165	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
170	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
175	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
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

Luminous Intensity Data -1

**Test Results – Luminous distribution intensity data-2**

C range: 0-360 DEG C, Interval: 5.0 DEG,  $\gamma$  range: 0-180 DEG,  $\gamma$  Interval: 5.0 DEG

C (DEG) $\gamma$ (DEG)	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379
5	6025	6030	6027	6024	6023	6022	6014	6012	6007	5998	5989	5984	5972	5963	5947	5934	5922	5907	5894
10	5168	5163	5157	5145	5136	5133	5119	5112	5107	5100	5087	5074	5059	5039	5021	4998	4977	4955	4930
15	3913	3913	3911	3906	3899	3891	3879	3869	3860	3850	3839	3829	3818	3803	3787	3772	3757	3735	3716
20	2798	2804	2803	2800	2797	2791	2782	2774	2766	2759	2748	2736	2727	2711	2698	2679	2656	2637	2622
25	1842	1845	1845	1845	1842	1837	1831	1825	1817	1811	1801	1792	1781	1770	1755	1744	1733	1710	1700
30	1244	1246	1246	1245	1243	1241	1237	1233	1229	1224	1219	1216	1210	1205	1200	1194	1188	1177	1169
35	797	799	798	797	794	792	787	783	779	773	765	758	752	744	737	731	725	713	712
40	338	339	339	337	335	332	331	328	326	322	320	317	313	309	305	301	297	292	286
45	77.5	77.9	78.0	78.1	77.7	77.6	77.3	76.8	76.3	75.4	74.7	73.4	72.2	70.9	69.9	68.7	67.3	74.5	73.1
50	24.3	24.1	24.1	24.1	24.0	24.0	23.9	24.0	23.8	24.0	23.9	23.9	23.9	23.9	23.9	24.0	24.1	24.2	24.2
55	6.98	6.91	6.83	6.77	6.71	6.66	6.60	6.55	6.49	6.43	6.38	6.32	6.26	6.22	6.20	6.20	6.21	6.27	6.33
60	5.12	5.06	5.01	4.96	4.92	4.87	4.82	4.77	4.72	4.66	4.61	4.55	4.50	4.46	4.43	4.42	4.43	4.41	4.45
65	3.75	3.72	3.69	3.66	3.62	3.59	3.55	3.51	3.47	3.42	3.37	3.33	3.29	3.26	3.23	3.21	3.21	3.19	3.21
70	2.76	2.75	2.73	2.70	2.68	2.66	2.62	2.59	2.55	2.51	2.48	2.45	2.41	2.38	2.36	2.34	2.34	2.33	2.34
75	2.01	1.99	1.98	1.97	1.95	1.94	1.92	1.90	1.87	1.85	1.83	1.80	1.77	1.75	1.73	1.71	1.70	1.70	1.70
80	1.35	1.36	1.36	1.36	1.35	1.34	1.33	1.32	1.31	1.29	1.28	1.26	1.24	1.23	1.22	1.21	1.20	1.19	1.19
85	0.73	0.74	0.75	0.75	0.74	0.73	0.72	0.72	0.72	0.72	0.72	0.71	0.70	0.70	0.69	0.68	0.68	0.66	0.66
90	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01
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	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
135	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
140	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.01
145	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
150	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
155	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
160	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
165	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
170	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
175	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
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

Luminous Intensity Data -2

**Test Results – Luminous distribution intensity data-3**

C range: 0-360 DEG C, Interval: 5.0 DEG,  $\gamma$  range: 0-180 DEG,  $\gamma$  Interval: 5.0 DEG

C (DEG) \ $\gamma$ (DEG)	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
0	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379
5	5878	5864	5855	5842	5843	5841	5839	5831	5830	5826	5815	5820	5815	5820	5816	5808	5803	5801	5798
10	4906	4886	4864	4847	4827	4814	4796	4784	4770	4755	4751	4743	4737	4731	4723	4718	4712	4706	4701
15	3699	3682	3664	3650	3635	3620	3606	3593	3580	3566	3554	3541	3532	3522	3511	3506	3500	3502	3504
20	2608	2595	2578	2568	2554	2538	2526	2515	2500	2488	2479	2467	2456	2449	2443	2437	2431	2429	2428
25	1690	1676	1666	1657	1649	1639	1631	1624	1614	1605	1595	1587	1578	1573	1568	1562	1557	1554	1554
30	1164	1159	1155	1150	1147	1143	1138	1134	1130	1125	1121	1117	1112	1109	1106	1103	1100	1099	1099
35	705	697	689	683	676	670	664	657	651	645	640	635	630	623	619	616	615	613	617
40	282	277	273	269	265	261	256	252	248	245	241	238	235	232	230	227	226	225	225
45	71.8	70.3	68.9	67.7	66.4	65.0	63.8	62.6	61.3	59.8	51.6	50.5	49.6	48.5	47.6	46.8	46.2	45.6	45.2
50	24.2	24.3	24.3	24.3	24.3	24.1	23.9	23.7	23.5	23.3	23.2	22.9	22.5	22.1	21.8	21.6	21.4	21.2	21.0
55	6.40	6.47	6.57	6.65	6.71	6.76	6.79	6.78	6.74	6.66	6.56	6.45	6.33	6.23	6.09	5.99	5.90	5.83	5.71
60	4.50	4.57	4.64	4.70	4.75	4.78	4.79	4.77	4.73	4.66	4.59	4.51	4.42	4.33	4.25	4.18	4.11	4.06	4.01
65	3.24	3.28	3.32	3.36	3.39	3.42	3.42	3.41	3.38	3.33	3.27	3.21	3.15	3.09	3.03	2.98	2.93	2.89	2.86
70	2.36	2.38	2.41	2.44	2.46	2.47	2.47	2.46	2.44	2.40	2.36	2.32	2.27	2.23	2.19	2.16	2.13	2.11	2.09
75	1.71	1.72	1.74	1.75	1.76	1.77	1.76	1.75	1.73	1.70	1.67	1.63	1.61	1.58	1.56	1.54	1.53	1.52	1.51
80	1.18	1.18	1.18	1.18	1.18	1.18	1.17	1.16	1.14	1.12	1.09	1.07	1.04	1.02	1.01	0.99	0.99	0.98	0.98
85	0.66	0.65	0.64	0.63	0.62	0.62	0.61	0.60	0.58	0.56	0.52	0.51	0.49	0.48	0.47	0.45	0.44	0.43	0.42
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	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
135	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
140	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.02
145	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
150	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
155	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
160	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
165	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02
170	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
175	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
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

Luminous Intensity Data -3



**Test Results – Luminous distribution intensity data-4**

 C range: 0-360 DEG C, Interval: 5.0 DEG,  $\gamma$  range: 0-180 DEG,  $\gamma$  Interval: 5.0 DEG

C (DEG) \ $\gamma$ (DEG)	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355				
0	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379	6379				
5	5795	5792	5783	5798	5815	5816	5823	5814	5824	5834	5843	5853	5864	5877	5885				
10	4701	4699	4701	4708	4719	4730	4745	4759	4774	4793	4815	4835	4857	4878	4902				
15	3510	3513	3516	3521	3526	3531	3538	3548	3560	3576	3593	3611	3625	3640	3652				
20	2427	2431	2433	2440	2447	2456	2464	2471	2482	2492	2505	2516	2530	2544	2557				
25	1553	1557	1558	1562	1563	1566	1573	1578	1584	1591	1597	1607	1618	1629	1639				
30	1099	1100	1102	1103	1104	1106	1109	1112	1117	1123	1127	1132	1139	1145	1151				
35	613	614	619	618	623	627	630	636	640	645	651	657	664	671	679				
40	224	225	225	226	227	228	231	234	236	239	243	248	254	259	266				
45	45.0	44.9	44.8	44.7	44.9	45.2	45.4	45.9	46.4	46.9	47.5	48.4	49.1	49.9	59.0				
50	20.9	20.8	20.7	20.6	20.5	20.4	20.4	20.4	20.4	20.5	20.5	20.6	20.6	20.8	21.0				
55	5.65	5.61	5.57	5.53	5.50	5.49	5.49	5.51	5.55	5.60	5.66	6.27	5.83	5.93	6.03				
60	3.96	3.93	3.90	3.88	3.86	3.86	3.86	3.88	3.91	3.95	3.99	4.05	4.13	4.19	4.27				
65	2.83	2.81	2.79	2.78	2.78	2.79	2.80	2.81	2.83	2.85	2.88	2.91	2.95	3.00	3.06				
70	2.08	2.07	2.06	2.06	2.06	2.06	2.07	2.07	2.08	2.09	2.11	2.13	2.15	2.18	2.22				
75	1.50	1.50	1.50	1.50	1.50	1.51	1.51	1.51	1.52	1.52	1.53	1.54	1.55	1.56	1.59				
80	0.98	0.99	0.98	0.98	0.99	1.00	1.00	1.00	1.00	1.01	1.01	1.02	1.03	1.03	1.03				
85	0.41	0.40	0.39	0.39	0.38	0.39	0.39	0.39	0.39	0.40	0.40	0.42	0.42	0.43	0.45				
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				
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				
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				
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				
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				
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				
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				
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				
130	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
135	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
140	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
145	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02				
150	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02				
155	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02				
160	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02				
165	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02				
170	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02				
175	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02				
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				

Luminous Intensity Data -4

**Photometric Testing Information**

The sample was evaluated for photometric and electrical characteristics using a goniophotometer, each located in purpose-built, temperature and humidity-controlled, draft free environments.

**Lamp / Luminaire Stabilization.**

The sample was placed inside the integrating sphere or set up to goniophotometer system and powered by a regulated and conditioned, alternating current supply. The correlated color temperature, color rendering index, chromaticity coordinates and electrical power measurements contained in this report are the numeric readings upon which stabilization is verified. The stabilization times shown on the results pages of this report denote the time of the 1<sup>st</sup> measurement (of the 3 consecutive readings) since this is the minimum time that the sample is assumed to have taken to reach stabilization.

The goniophotometer is calibrated using a tungsten lamp with the following specifications:

Manufacturer: Everfine

Part Number: D908

Bulb Number: 11090005

Voltage: 82.98 Volts

Calibration Current: 6.9258 Amperes

Luminous Flux = 8779 Lumens (ilac-MRA traceable)

A *Power Analyzer* was used to measure all electrical characteristics of the sample.

CSA is an accredited Test Laboratory (TL-555)  
to IESNA LM-79-08 by IAS  
(International Accreditation Service)



<b>Equipment List:</b>				
<b>Description</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Range</b>	<b>Calibration Due Date</b>
Goniophotometer	EVERFINE	GO-R5000	/	N/A
Photometer Head	EVERFINE	ID-1000	0.0001~200000lx	Nov.2017
Photometer Head	EVERFINE	ID-1000	0.0001~200000lx	Nov.2017
Spectroradiometer	EVERFINE	HAAS-2000	380nm~780nm	Nov.2017
Standard Lamp	EVERFINE	D908	2788K, 8779lm	Oct.2017
Power Analyzer	Yokogawa	WT210	15/30/60/150/300/600V 5/10/20/50/100/200mA DC10Hz~20kHz	Nov.2017
Digital DC Power Supply	Keithley	2420	Volts Ranges: 0.2, 2, 20, 60 V Basic V Source Accuracy: 0.02%	Nov.2017
AC Power Supply	Agilent	6812B	300 V 6.5 A	Nov.2017

**End of Report**