



LM-79-08 Test Report

for

Philips (China) Investment Co., Ltd.

Building 9, Lane 888, Tianlin Road
Shanghai, China

InstantFit LEDtube

Model: 9290002840

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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www.ledtestlab.com

Report No.: HZ13100027a

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

Review by:

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Oct. 24, 2013

Approved by:



Jim Zhang

Manager: Jim Zhang
Oct. 24, 2013

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: 9290002840

Photometric and Electrical Measurements for two lamps

Voltage (V AC)	Current (A)	Power (W)	Power Factor	Total Luminous Flux (lm)	Luminous Efficacy (lm/W)	Total Harmonic Distortion
120.0	0.288	34.4	0.9972	3011	87.5	6.21

Photometric and Colorimetric Measurements for each lamp

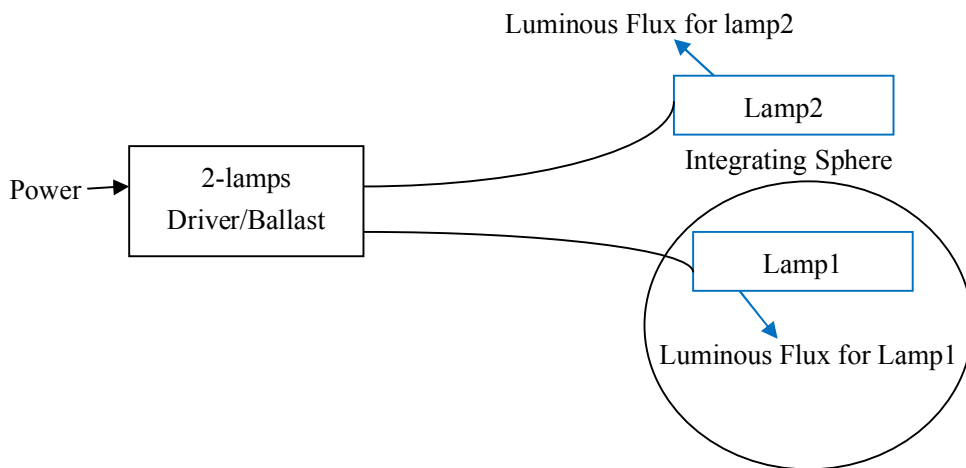
Sample Number	Luminous Flux(lm)	Correlated Color Temperature (K)	Color Rendering Index Ra
s13100027-01	1505	3061	81.6
s13100027-02	1506	3066	81.8
Sample Number	Color Rendering Index R9	Chromaticity Coordinate x	Chromaticity Coordinate y
s13100027-01	15.5	0.4327	0.4029
s13100027-02	15.9	0.4322	0.4025

Table 1: Executive Data Summary

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

$$\text{Luminous Efficacy} = (\text{Luminous Flux for lamp1} + \text{Luminous Flux for lamp2}) / \text{Power}$$

Test figure is shown as following:



Test specifications:

- Date of Receipt** : Oct. 29, 2013
- Date of Test** : Oct. 29, 2013
- 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

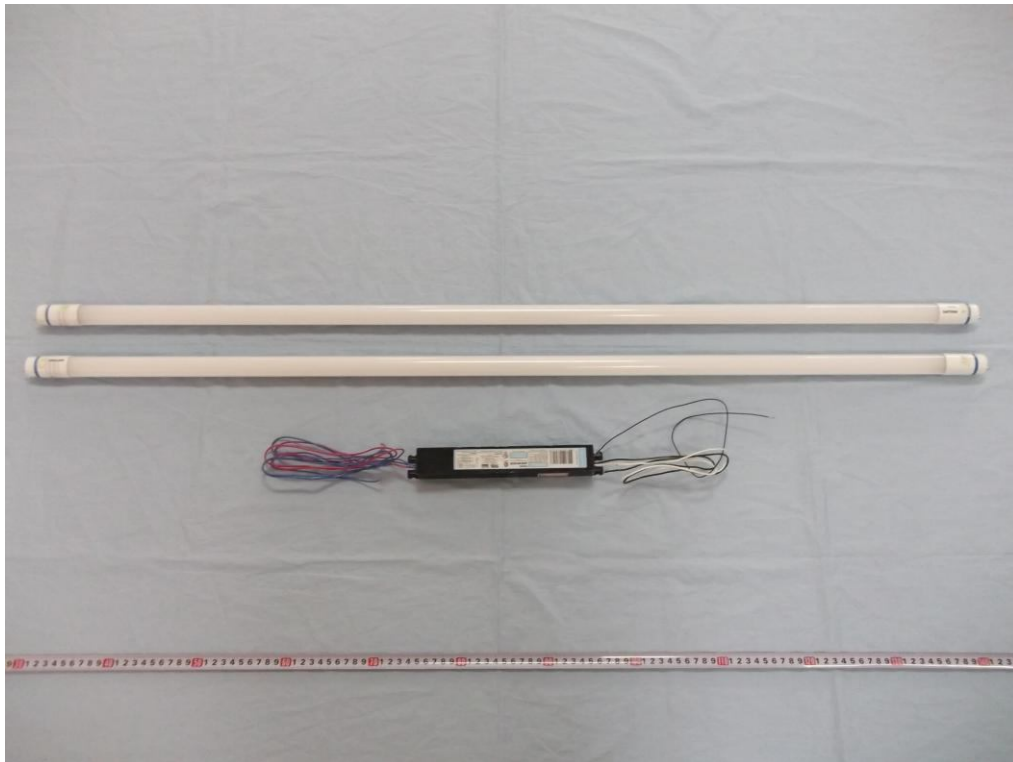


Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: InstantFit LEDtube
Model	: 9290002840
Electrical Ratings	: 120V AC, 60Hz, 17.5W
Product Description	: G13 base, 3000K
Manufacturer	: Philips (China) Investment Co., Ltd.
Address	: Building 9, Lane 888, Tianlin Road Shanghai, China

TEST RESULTS

Test ambient temperature was 25.3°C

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

The stabilization time of the sample was 70 minutes, and the total operating time including stabilization was 105 minutes.

Sphere-Spectroradiometer Method

Parameter	Result		Special Color Rendering Indices		
	1#	2#		1#	2#
Test Voltage (V)	120.0				
Voltage frequency (Hz)	60				
Test Current (A)	0.288				
Power Factor	0.9973				
Test Power (W)	34.4				
Luminous Efficacy (lm/W)	87.5				
THD A%	6.21				
Total Luminous Flux (lm)	1505	1506			
Color Rendering Index (CRI)	81.6	81.8	R1	79.6	79.8
R9	15.5	15.9	R2	88.1	88.3
Correlated Color Temperature (CCT) (K)	3061	3066	R3	94.8	94.9
Chromaticity (Chroma x, Chroma y)	(0.4327, 0.4029)	(0.4322, 0.4025)	R4	79.2	79.3
Chromaticity (Chroma u, Chroma v)	(0.2483, 0.3468)	(0.2482, 0.3467)	R5	78.7	78.9
Chromaticity (Chroma u', Chroma v')	(0.2483, 0.5203)	(0.2482, 0.5201)	R6	83.4	83.6
Duv	0.0001	0	R7	85.5	85.6
			R8	63.7	63.9
			R9	15.5	15.9
			R10	71.9	72.3
			R11	76.3	76.4
			R12	62.1	62.3
			R13	81.2	81.4
			R14	96.9	96.9

Table 2: Test data per Sphere-Spectroradiometer Method

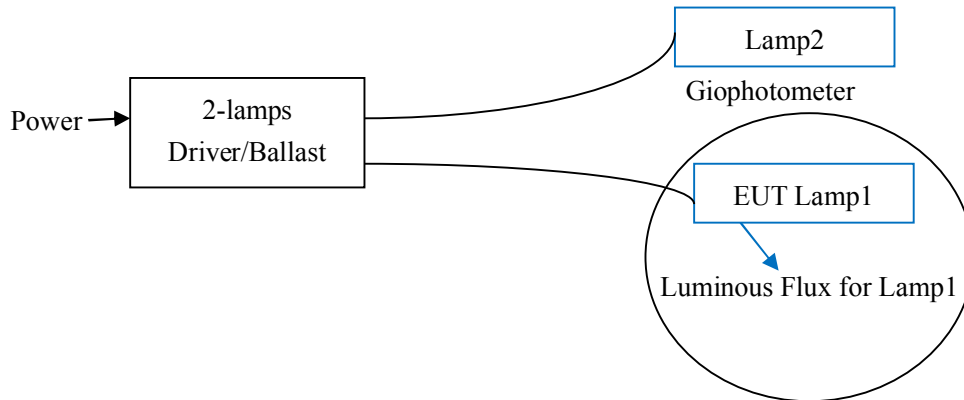
Note: According to CIE 1976 (u',v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Goniophotometer Method

The photometric distance is 2.475m.

Luminous data was taken at 0.5°vertical intervals and 5°horizontal intervals.

Test figure is shown as following:



Note: One lamp was tested in Giophotometer system. The total electrical input data was recorded before the ballast and divided by 2 in table below to be used as the input data of the tested one lamp.

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.145
Power Factor	0.9971
Test Power (W)	17.3
Luminous Efficacy (lm/W)	87.6
Total Luminous Flux (lm)	1514.9
Beam Angle (°)	141.0
Center Beam Candle Power (cd)	337
Maximum Beam Candle Power (cd)	336.8 (At: C=200.0, Gamma=2.0)
Spacing Criteria	1.30 (0° -180°)/ 1.38(90° -270°)
Zonal Lumens in the 0°-60°Zone	56.00%
Zonal Lumens in the 60°-90°Zone	29.51%
Zonal Lumens in the 90°-120°Zone	11.97%
Zonal Lumens in the 120°-180°Zone	2.52%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution of 2# tube - Sphere Spectroradiometer Method

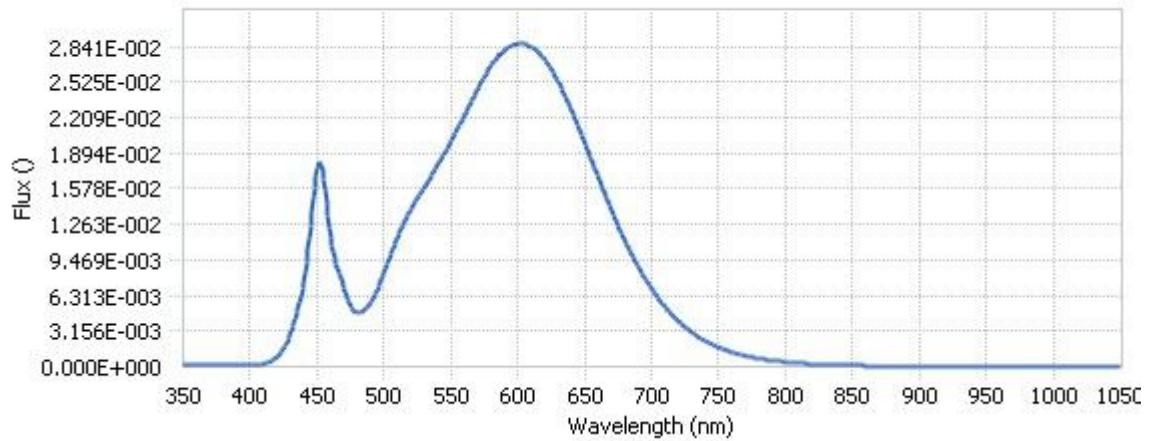
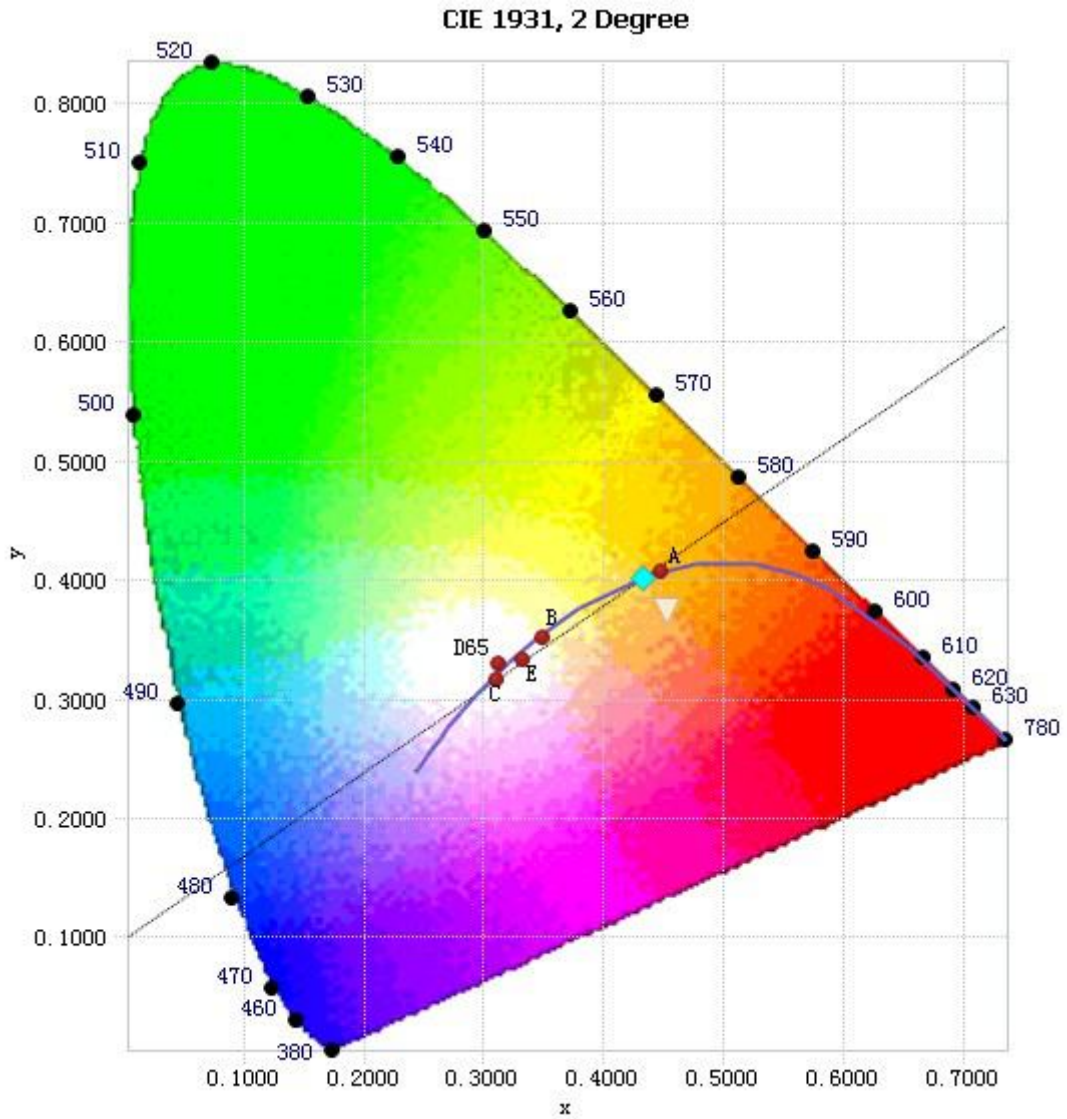


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.20E-04	485	5.03E-03	590	2.80E-02	695	7.86E-03
385	1.39E-04	490	5.71E-03	595	2.85E-02	700	6.89E-03
390	1.07E-04	495	6.85E-03	600	2.87E-02	705	6.06E-03
395	1.14E-04	500	8.42E-03	605	2.86E-02	710	5.30E-03
400	1.33E-04	505	1.00E-02	610	2.84E-02	715	4.64E-03
405	1.68E-04	510	1.15E-02	615	2.80E-02	720	4.08E-03
410	2.34E-04	515	1.28E-02	620	2.73E-02	725	3.54E-03
415	4.22E-04	520	1.39E-02	625	2.64E-02	730	3.06E-03
420	8.31E-04	525	1.50E-02	630	2.54E-02	735	2.65E-03
425	1.55E-03	530	1.59E-02	635	2.41E-02	740	2.30E-03
430	2.80E-03	535	1.69E-02	640	2.27E-02	745	1.98E-03
435	4.73E-03	540	1.79E-02	645	2.14E-02	750	1.71E-03
440	7.54E-03	545	1.89E-02	650	1.99E-02	755	1.49E-03
445	1.25E-02	550	1.99E-02	655	1.83E-02	760	1.29E-03
450	1.77E-02	555	2.11E-02	660	1.69E-02	765	1.11E-03
455	1.66E-02	560	2.23E-02	665	1.53E-02	770	9.68E-04
460	1.14E-02	565	2.35E-02	670	1.39E-02	775	8.29E-04
465	8.69E-03	570	2.46E-02	675	1.25E-02	780	7.13E-04
470	7.00E-03	575	2.57E-02	680	1.12E-02		
475	5.39E-03	580	2.67E-02	685	9.99E-03		
480	4.77E-03	585	2.75E-02	690	8.89E-03		

Table 3: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram of 2# tube - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4322, 0.4025)

Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

Note: The location on the diagram of the tristimulus coordinates are indicated by the blue diamond.

Nominal CCT Quadrangles of 2# tube – Sphere Spectroradiometer Method

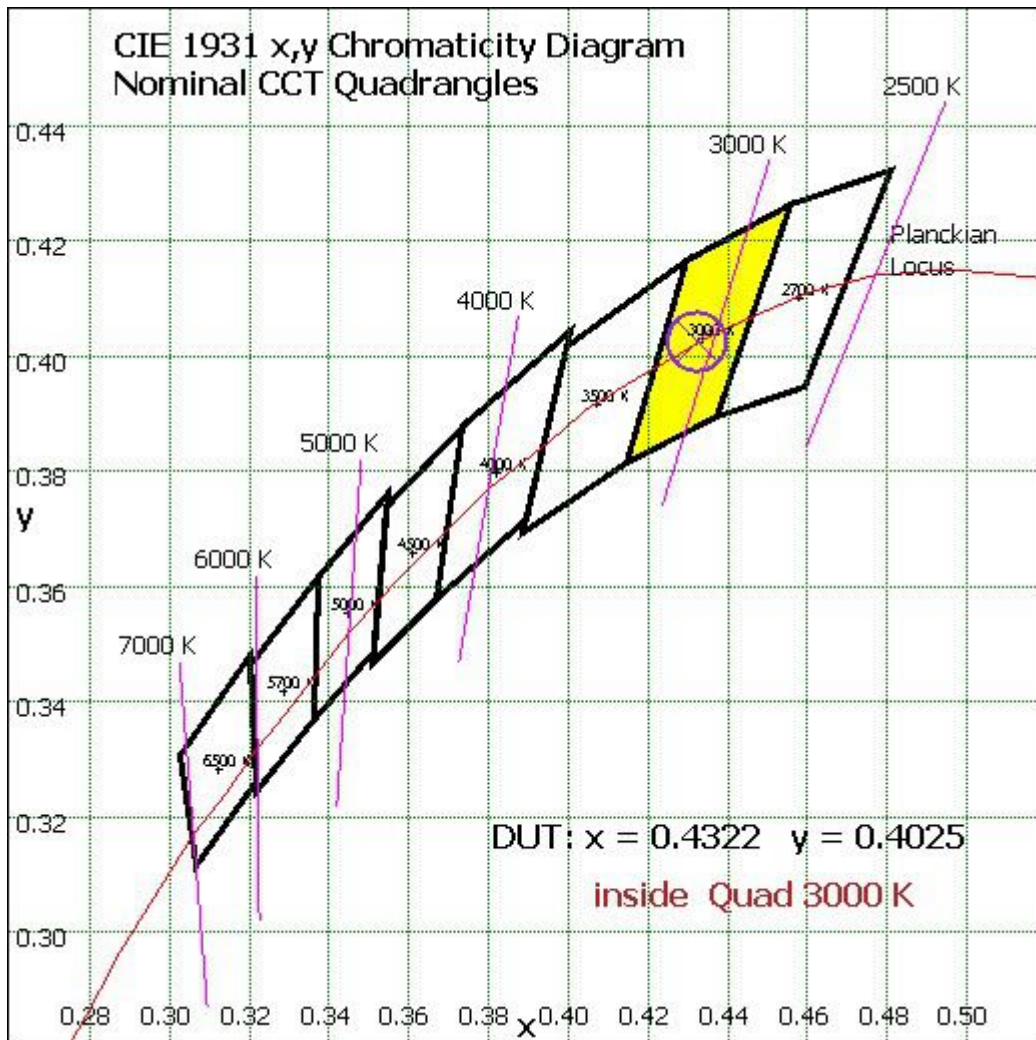


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

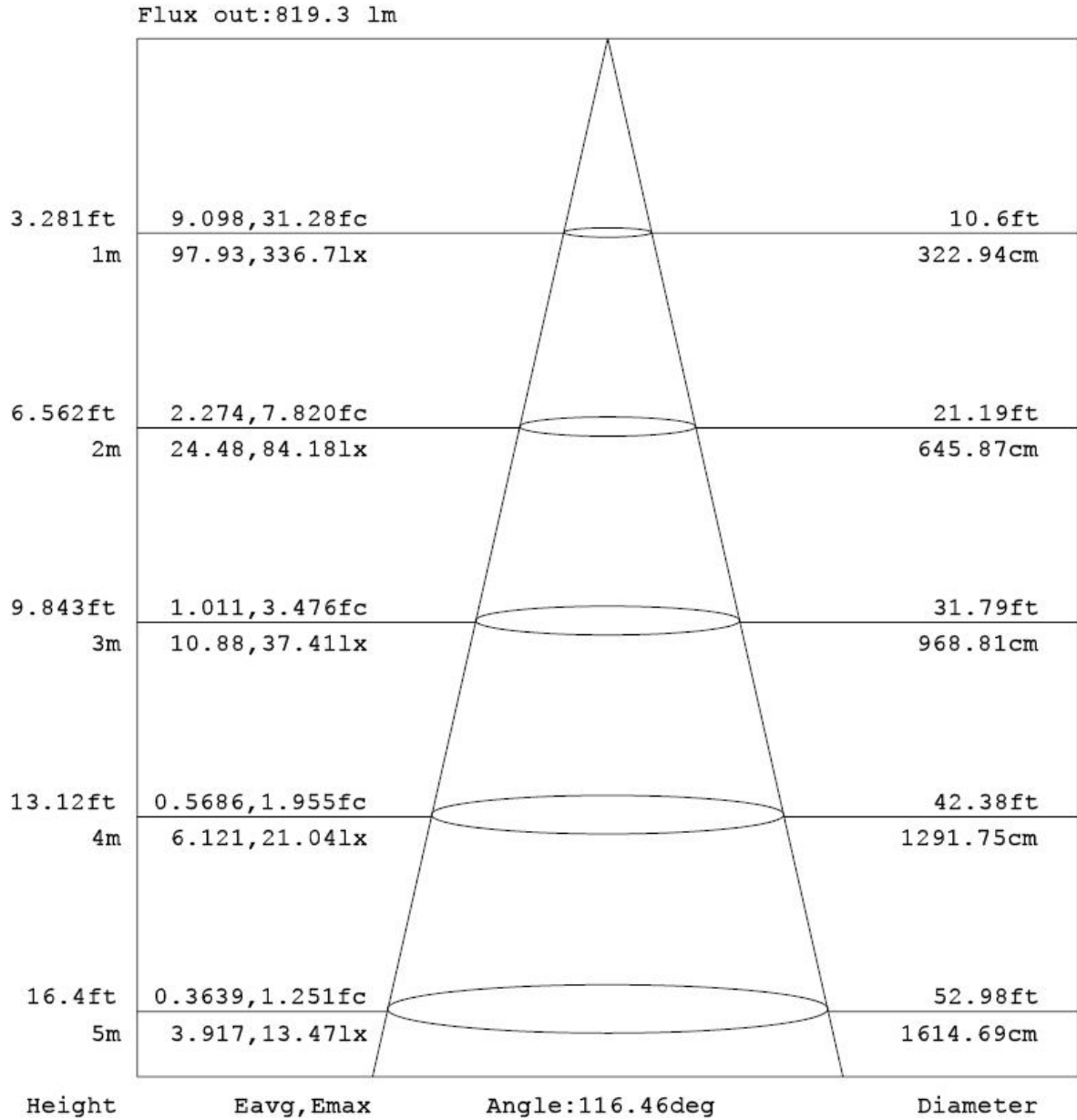
Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	31.952	2.11%
10- 20	92.624	6.11%
20- 30	143.945	9.50%
30- 40	180.794	11.93%
40- 50	199.692	13.18%
50- 60	199.429	13.16%
60- 70	181.525	11.98%
70- 80	150.567	9.94%
80- 90	114.896	7.58%
90-100	84.045	5.55%
100-110	58.989	3.89%
110-120	38.374	2.53%
120-130	22.078	1.46%
130-140	10.612	0.70%
140-150	3.894	0.26%
150-160	1.2	0.08%
160-170	0.278	0.02%
170-180	0.05	0.00%
Total	1514.9	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	848.436	56.00%
60- 90	446.988	29.51%
0-90	1295.424	85.51%
90- 180	219.52	14.49%
0- 180	1514.9	100%

Table 5: Zonal Lumen Data

Illuminance Plots- Goniophotometer Method



Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

Chart 4: Beam Angle

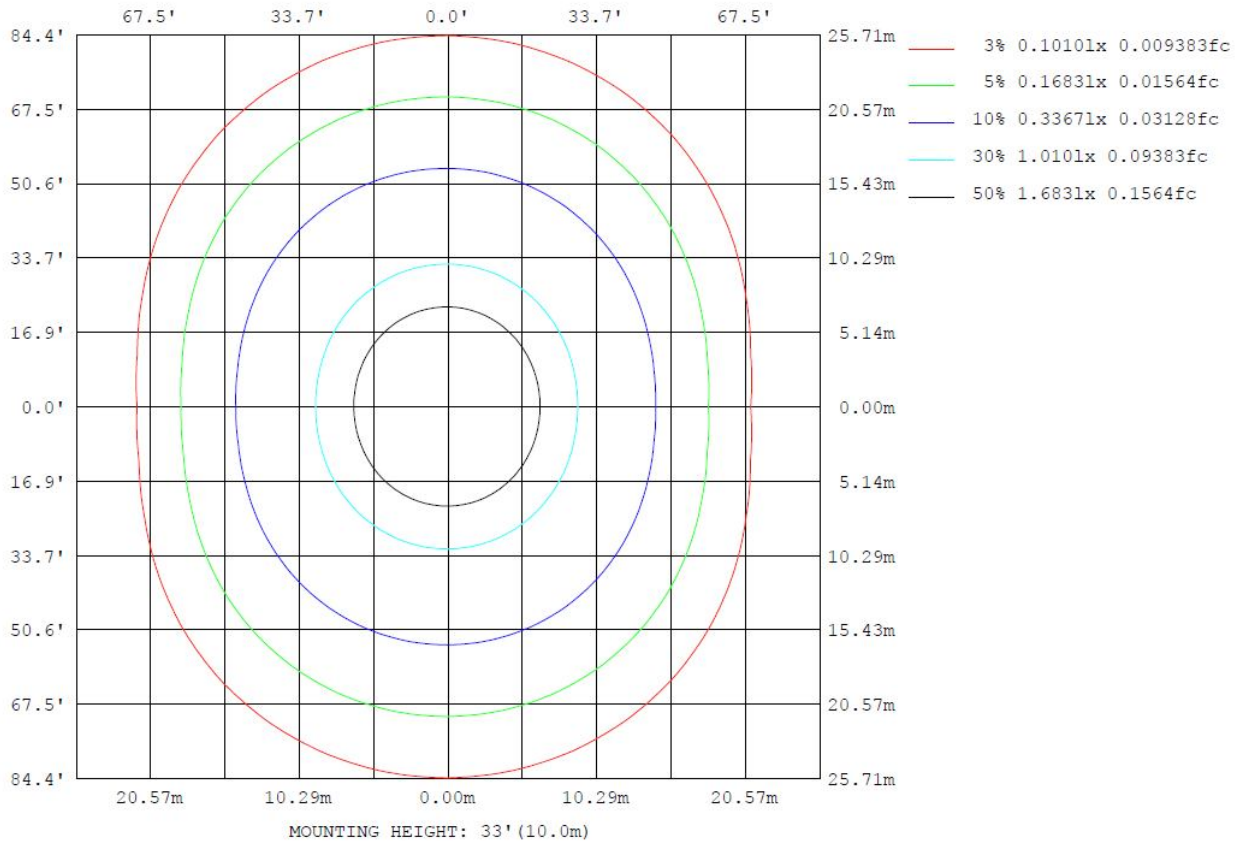


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

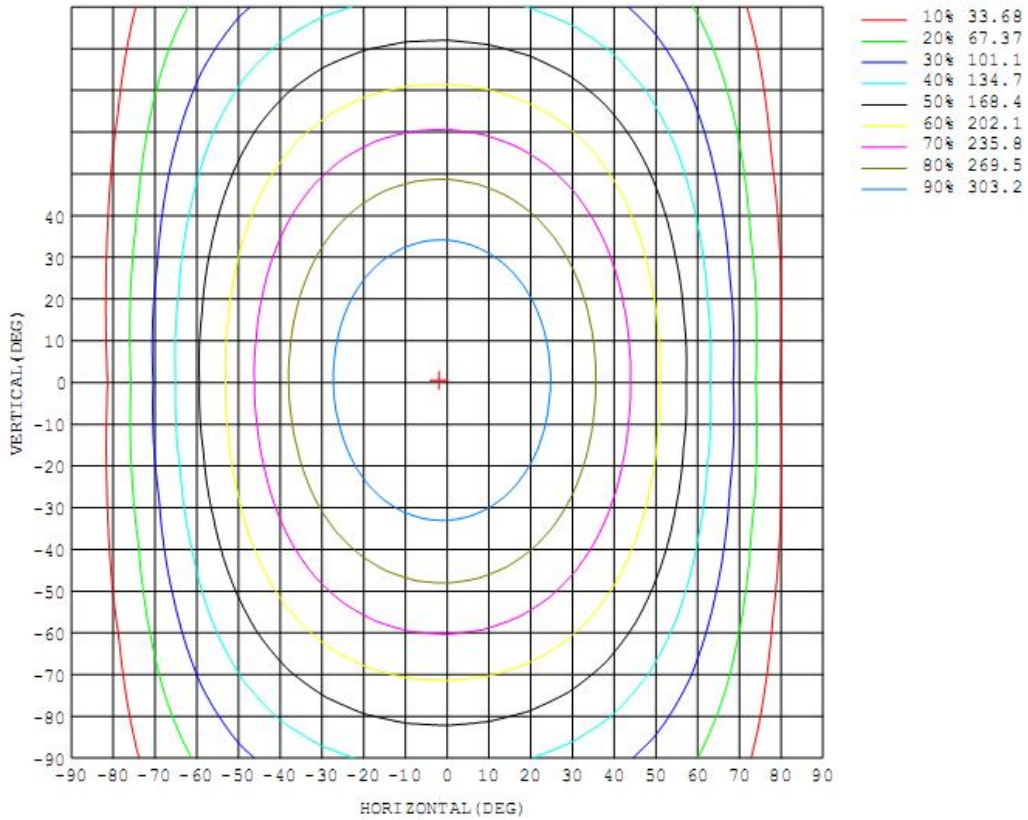


Chart 6: Isocandela Plot

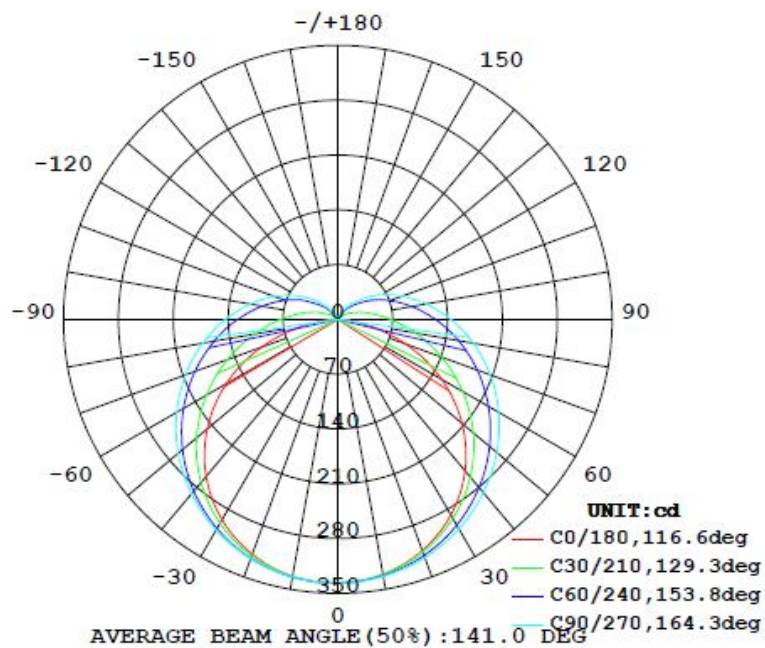


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

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	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337
5	335	335	335	335	335	335	335	335	336	336	336	336	336	336	336	336	336	336	336
10	330	331	331	331	331	332	332	333	333	333	333	333	333	333	333	333	333	333	333
15	324	324	324	325	326	326	327	328	329	329	330	329	329	329	328	328	328	327	328
20	314	314	315	316	318	319	321	322	323	324	324	324	323	322	321	320	320	319	319
25	303	303	304	306	308	311	313	315	316	317	317	317	316	314	313	311	309	309	309
30	288	289	291	293	297	300	303	306	308	309	309	308	307	304	302	299	297	296	296
35	272	272	275	279	284	288	292	296	298	300	299	298	296	293	289	285	282	280	280
40	252	253	257	263	269	275	280	284	287	289	289	287	284	280	275	270	265	262	262
45	231	232	238	245	253	260	267	272	276	277	277	275	271	265	259	252	246	242	241
50	207	209	216	225	235	245	253	259	263	265	264	261	256	250	242	233	225	219	218
55	181	184	193	205	217	228	237	245	249	251	251	247	241	233	223	213	202	194	192
60	153	157	169	184	198	211	222	230	235	237	236	232	226	216	204	191	178	168	165
65	123	129	144	162	179	194	206	214	220	222	221	217	209	199	185	169	153	139	135
70	91.8	101	120	141	160	176	189	199	204	207	206	201	193	181	166	147	127	110	104
75	60.9	72.8	95.9	120	141	159	173	183	189	191	190	185	176	163	146	126	103	80.9	72.0
80	32.0	48.0	74.2	100	123	142	156	167	173	175	174	169	159	146	128	106	79.8	54.3	41.5
85	9.26	27.8	56.0	82.6	106	125	140	151	157	160	158	153	143	129	110	87.0	60.3	32.0	15.9
90	0.15	14.8	41.0	67.5	90.4	110	125	135	142	144	143	137	127	113	93.9	70.7	44.1	16.9	1.31
95	0.14	8.16	29.9	54.3	76.3	95.1	110	120	127	129	127	122	112	97.8	79.2	57.1	31.9	8.90	0.22
100	0.00	4.83	22.0	43.5	64.3	81.6	95.8	106	112	114	113	107	97.7	83.9	66.7	45.6	23.2	5.07	0.16
105	0.00	3.33	15.9	34.6	53.3	69.7	82.7	92.3	98.3	100	98.9	93.6	84.3	71.5	55.2	36.2	16.7	3.36	0.19
110	0.00	2.40	11.7	26.9	43.7	58.7	70.6	79.5	85.0	87.2	85.7	80.5	71.9	60.2	45.2	28.1	12.2	2.46	0.22
115	0.00	1.83	8.89	20.7	34.9	48.6	59.8	67.9	72.8	74.6	73.2	68.8	60.9	49.9	36.1	21.6	9.13	1.88	0.24
120	0.00	1.45	6.79	16.0	27.4	38.9	49.2	56.8	61.5	63.3	62.0	57.5	50.1	40.0	28.3	16.5	6.92	1.50	0.25
125	0.05	1.14	5.21	12.4	21.4	30.7	39.1	45.8	50.1	51.8	50.6	46.4	39.8	31.5	22.0	12.8	5.25	1.21	0.27
130	0.12	0.95	3.99	9.51	16.5	24.0	30.8	36.2	39.6	41.0	40.0	36.6	31.4	24.6	16.9	9.78	4.11	1.04	0.31
135	0.19	0.81	3.00	7.15	12.6	18.3	23.7	28.2	31.0	32.1	31.2	28.5	24.1	18.7	12.9	7.40	3.12	0.88	0.35
140	0.27	0.64	2.18	5.25	9.34	13.8	17.8	21.1	23.3	24.2	23.5	21.4	18.1	14.1	9.64	5.37	2.26	0.75	0.39
145	0.32	0.54	1.62	3.75	6.69	9.96	13.0	15.5	17.2	17.8	17.3	15.8	13.3	10.2	6.94	3.92	1.64	0.66	0.43
150	0.33	0.51	1.14	2.58	4.60	6.86	9.07	10.9	12.1	12.5	12.2	11.0	9.27	7.08	4.82	2.69	1.23	0.60	0.45
155	0.34	0.50	0.82	1.66	2.98	4.43	5.85	7.10	7.91	8.24	8.01	7.25	6.03	4.68	3.14	1.64	0.91	0.55	0.45
160	0.36	0.48	0.67	1.04	1.74	2.62	3.51	4.27	4.72	4.90	4.80	4.41	3.70	2.74	1.71	1.03	0.68	0.53	0.46
165	0.37	0.45	0.56	0.72	0.98	1.36	1.77	2.14	2.40	2.52	2.46	2.23	1.85	1.38	0.94	0.72	0.58	0.51	0.47
170	0.40	0.45	0.51	0.58	0.65	0.75	0.87	0.98	1.06	1.09	1.08	1.02	0.89	0.73	0.64	0.59	0.54	0.49	0.45
175	0.44	0.45	0.47	0.49	0.51	0.52	0.56	0.59	0.61	0.62	0.62	0.60	0.56	0.53	0.52	0.50	0.49	0.48	0.46
180	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47

Table 6: 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	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337	337		
5	336	336	336	336	336	336	336	336	336	336	336	336	335	335	335	335	335		
10	333	333	334	334	334	334	334	334	334	334	333	333	332	332	331	331	331		
15	328	328	329	329	330	330	331	331	330	330	329	328	327	326	325	324	324		
20	320	320	322	323	324	325	325	326	325	325	324	322	320	319	317	316	315		
25	309	311	312	314	316	317	319	319	319	318	316	314	312	309	307	304	303		
30	296	298	301	304	306	309	310	311	311	310	308	305	301	298	294	291	289		
35	281	284	287	291	295	298	300	302	301	300	297	294	289	284	280	276	273		
40	263	267	272	277	282	286	289	291	291	289	286	281	276	270	263	258	254		
45	243	248	254	261	268	273	277	279	279	277	273	268	261	253	245	238	233		
50	221	227	236	244	252	259	263	266	266	264	260	253	245	235	226	217	210		
55	196	205	215	226	236	244	249	252	252	250	245	238	228	217	205	193	185		
60	170	181	194	207	218	228	234	237	238	235	230	221	211	197	183	169	158		
65	142	156	172	187	201	211	218	222	222	220	214	205	193	178	161	144	130		
70	113	131	150	168	183	194	202	206	207	204	198	188	175	159	139	119	101		
75	83.7	106	129	149	165	177	186	190	191	188	181	171	157	140	118	94.5	72.0		
80	56.9	82.9	108	130	148	160	169	174	175	172	165	155	140	121	98.2	72.2	46.0		
85	34.5	62.8	89.5	112	130	144	153	158	159	156	149	139	123	104	80.2	53.2	25.5		
90	18.9	46.2	72.9	95.9	114	128	137	143	144	141	134	123	108	88.0	64.6	38.2	12.6		
95	10.3	33.6	58.6	80.9	99.0	113	122	127	128	125	119	108	92.8	73.9	51.4	27.2	6.45		
100	4.63	23.0	46.7	67.6	84.9	98.2	107	112	114	111	104	93.7	79.3	61.4	40.6	19.4	3.55		
105	0.94	16.4	35.2	55.7	72.0	84.5	93.4	98.3	99.4	96.8	90.5	80.6	67.0	50.4	31.6	13.6	1.56		
110	0.25	9.49	27.1	43.5	60.0	71.9	80.2	84.9	86.0	83.5	77.6	68.4	55.8	40.4	24.0	9.71	0.47		
115	0.01	4.85	18.0	34.4	47.7	59.8	67.8	72.2	73.2	71.0	65.4	56.7	45.1	31.8	18.0	5.64	0.28		
120	0.15	1.39	12.4	24.9	37.0	48.0	55.6	59.8	60.7	58.6	53.5	45.7	35.9	24.6	12.7	3.19	0.16		
125	0.19	0.82	3.95	17.1	28.0	35.4	43.7	48.0	49.0	47.2	42.8	36.3	28.0	18.0	7.14	1.72	0.14		
130	0.23	0.53	2.36	8.78	19.5	27.1	32.8	37.0	38.1	36.7	33.1	27.8	20.3	10.1	4.38	1.02	0.15		
135	0.29	0.41	1.35	3.84	8.94	18.2	24.3	27.3	28.0	27.0	24.2	18.2	10.9	5.96	2.37	0.68	0.17		
140	0.38	0.41	0.74	2.04	4.87	7.98	11.2	15.0	16.7	15.2	11.9	9.49	6.14	3.31	1.34	0.46	0.21		
145	0.43	0.43	0.51	1.11	2.26	4.30	6.34	7.54	8.24	8.11	7.20	5.34	3.26	1.73	0.83	0.35	0.26		
150	0.45	0.46	0.30	0.52	1.11	2.09	3.01	3.78	4.16	4.07	3.46	2.59	1.75	1.02	0.50	0.31	0.29		
155	0.45	0.50	0.40	0.32	0.42	0.89	1.43	1.73	1.88	1.90	1.73	1.38	0.94	0.58	0.36	0.30	0.31		
160	0.45	0.48	0.50	0.41	0.35	0.34	0.43	0.74	0.88	0.89	0.81	0.68	0.52	0.39	0.35	0.31	0.32		
165	0.44	0.45	0.48	0.50	0.49	0.43	0.38	0.34	0.44	0.45	0.44	0.39	0.40	0.42	0.38	0.35	0.34		
170	0.44	0.45	0.45	0.46	0.47	0.49	0.49	0.49	0.47	0.42	0.47	0.46	0.46	0.43	0.41	0.40	0.39		
175	0.45	0.44	0.44	0.44	0.44	0.44	0.44	0.45	0.44	0.44	0.45	0.45	0.45	0.44	0.43	0.43	0.43		
180	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Sep. 18, 2013	Sep. 17, 2014
Digital Power Meter	PF2010A	HZTE028-01	Sep. 18, 2013	Sep. 17, 2014
AC Power Supply	PCR 500L	HZTE001-08	Sep. 18, 2013	Sep. 17, 2014
DC Power Supply	WY12010	HZTE004-03	Sep. 18, 2013	Sep. 17, 2014
Temperature Meter	TES1310	HZTE017-01	Sep. 18, 2013	Sep. 17, 2014
Standard source	D908	HZTE012-01	Sep. 18, 2013	Sep. 17, 2014
Integrate Sphere system	2M	HZTE015-01	Sep. 18, 2013	Sep. 17, 2014
Digital Power Meter	WT210	HZTE008-01	Sep. 18, 2013	Sep. 17, 2014
AC Power Supply	PCR 500L	HZTE001-07	Sep. 18, 2013	Sep. 17, 2014
DC Power Supply	6154	HZTE004-04	Sep. 18, 2013	Sep. 17, 2014
Temperature and humidity recorder	JR900	HZTE018-01	Sep. 18, 2013	Sep. 17, 2014
Standard source	SCL-1400	HZTE012-02	Sep. 18, 2013	Sep. 17, 2014

Table 4: 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.

Sphere-Spectroradiometer Method- Photometric and Electrical Measurements

A Labsphere Model CDS 2100 Spectroradiometer and Two Meter Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit. The coating reflectance of each sphere is 98%. The measure geometry is 4π . Self-absorption correction is conducted in testing. Bandwidth of spectroradiometer is 350nm-1050nm.

Ambient temperature was measured at a position inside the sphere. 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 Yokogawa Power Analyzer.

The standard reference of the integrated sphere system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Standards and Technology.

The uncertainty of integrating sphere system reported in this document is expanded uncertainty is 1.06% with a coverage factor $k=2$.

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 1.94% with a coverage factor $k=2$.

Color Characteristics Measurements

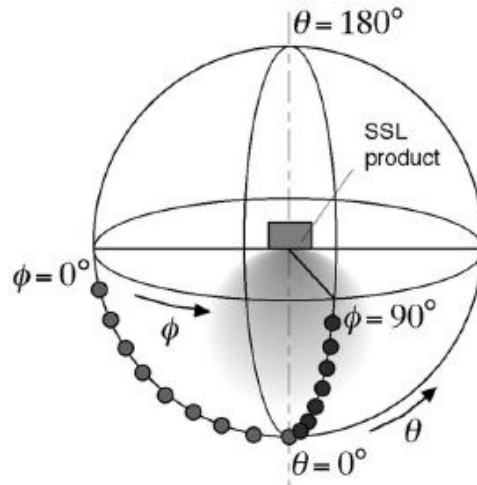
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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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