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Test report of
IES LM-79-08
Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Applicant:

P.Q.L., Inc.

Address:

2285 Ward Avenue / Simi Valley, CA 93065

For Product:

Mogul Screw-Base (E39) Replacements for HID Lamps -- Replacement Lamps for Outdoor Pole/Arm-Mounted Decorative Luminaires (UL Type B)

Model No.:

91692, 91578, 9169X-36-57K were selected as the representative models.
All measurements are the same except CCT.

Test laboratory: Shenzhen Belling Efficiency Testing Lab., 1/F., Building 1, 1F, No.1 building, Meibaohe industrial park, Dalang street, Shenzhen, Guangdong Prov.518101, China.

Ike.li

Jasonzhou

Complied by: Ike Li **Review by: Jason zhou**

Project Engineer **Technical Manager**

1 General

1.1 Product Information

Manufacturer	P.Q.L., Inc.
Manufacturer Address	2285 Ward Avenue / Simi Valley, CA 93065
Brand Name	Superior Life®
Luminaire Type	Replacement Lamps for Outdoor Pole/Arm-Mounted Decorative Luminaires (UL Type B)
Model Number	91692, 91578, 9169X-36-57K
Rated Inputs	AC 100-277V 50/60Hz
Rated Power	36W
Nominal CCT	3000K / 5700K
Date of Receipt Samples	2018-03-07
Date of Test	2018-03-08 to 2018-03-30

1.2 Standards or methods

- ANSI C78.377-2015:Specifications for the Chromaticity of Solid State Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits-Related Power Quality Requirements for Lighting Equipment
- CIE Publication No.13.3-1995:Method of Measuring and Specifying Color Rendering of Light Sources
- IESNA LM-79-08 Approved Method: Electric & Photometric Measurement of Solid-state Lighting Products

1.3 Equipment list

Device	Manufacture	Model No.	Serial No.	Calibration due date
Goniophotometeric System	SENSING	GMS-3000	N.A	2018-09-20
AC Power Source	ALL POWER	APW-110N	992257	2018-08-26
Total Luminous Flux Standard Lamp	SENSING	110V/100W	S13100234	2018-09-14
Digital Power Meter	YOKOGAWA	WT310	C2QM02030V	2018-08-28
Integral Sphere	SENSING	SPR-600M	N.A	2018-08-26
Digital Power Meter	YOKOGAWA	WT210	91L929742	2018-08-28
Optical Color and Electrical Measurement System	SENSING	SPR-3000	N.A	2018-08-26
Temperature/humidity/clock	VICTOR	VC230	57636	2018-09-12
Digital Anemometer	TECMAN	TD8901	026141	2018-09-12

Statement of Traceability: Shenzhen Belling Efficiency Testing Lab attests that all calibration has been performed using suitable standards traceable to national primary standards and International System of Unit (SI).

2 Test conducted and method

2.1 Ambient Condition

The ambient temperature in which measurements are being taken was maintained at 25°C ±1°C, the air flow around the sample(s) being tested did not affect the performance.

2.2 Power Supply Characteristics

The AC power supply had a sinusoidal voltage wave shape at the prescribed frequency (60 Hz) such that the RMS summation of the harmonic components does not exceed 3 percent of the fundamental during operation of the test item.

The voltage of AC power supply (RMS voltage) applied to the device under test was regulated to within±0.2 percent under load.

2.3 Seasoning and Stabilization

No seasoning was performed in accordance with IESNA LM-79-08. And before the measurement, the sample was stabilized until the light output and power variations were less than 0.5% in 30 minutes intervals (3 readings, 15 minutes apart).

2.4 Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, spectrophotometer, and integrating sphere. The integrating sphere system is calibrated by standard light source before measurement. The system and standard light source has been calibrated regularly and traceable to the National Primary Standards. 4π geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

2.5 Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement. The standard light source has been calibrated regularly and traceable to the National Primary Standards.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report. The method according to IESNA LM-79-08 following chapter.

3 Test Result Summary

3.1 Integrating Sphere System (Test in fixture Holophane GV Luminaires Washington PostLite)

3.1.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
91692	120.02	60	0.306	36.48	0.993
9169X-36-57K	120.02	60	0.306	36.48	0.993

3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
91692	4228.03	115.9	2909	82.2	6
9169X-36-57K	4395.84	120.5	5488	81.3	-4

3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
91692	-0.00037	0.4430	0.4051	0.2540	0.5227
9169X-36-57K	0.00284	0.3328	0.3469	0.2049	0.4805

3.2 Goniophotometer System (Test in fixture Holophane GV Luminaires Washington PostLite)

3.2.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
91692	120.03	60	0.3056	36.399	0.9924

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)
4210.98	115.69	80.495

3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
91692	Power Factor	277	60	0.919
	THD	277	60	12.6%

4 Test Data

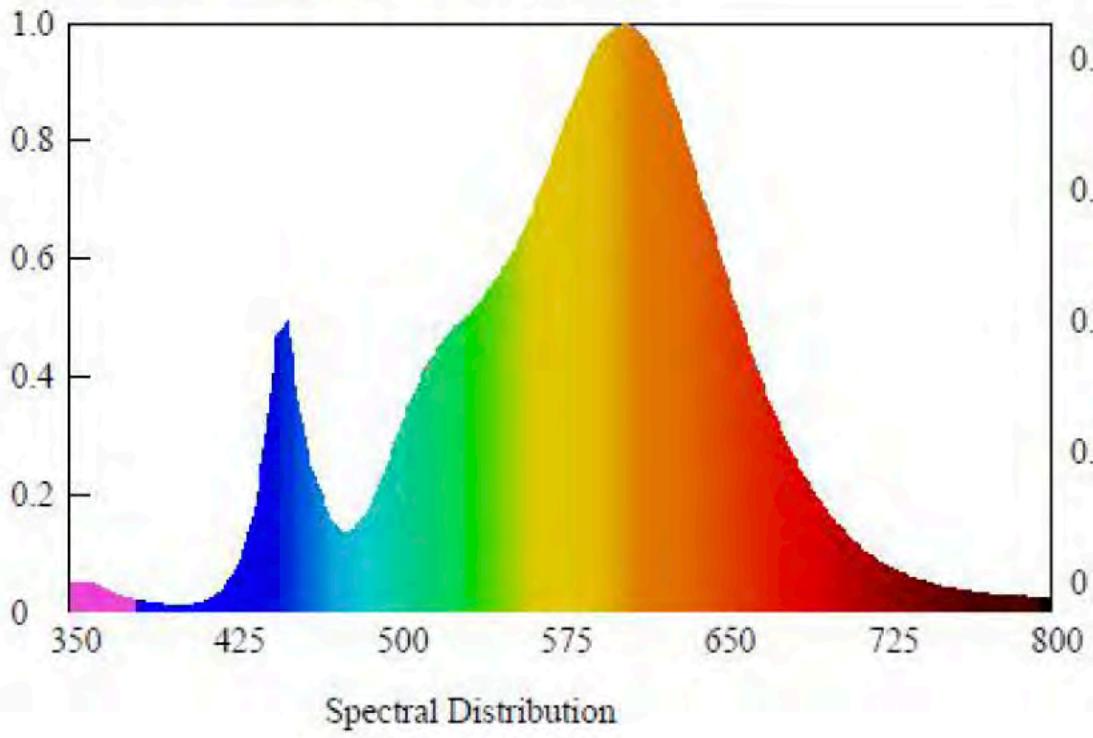
91692

Test Condition

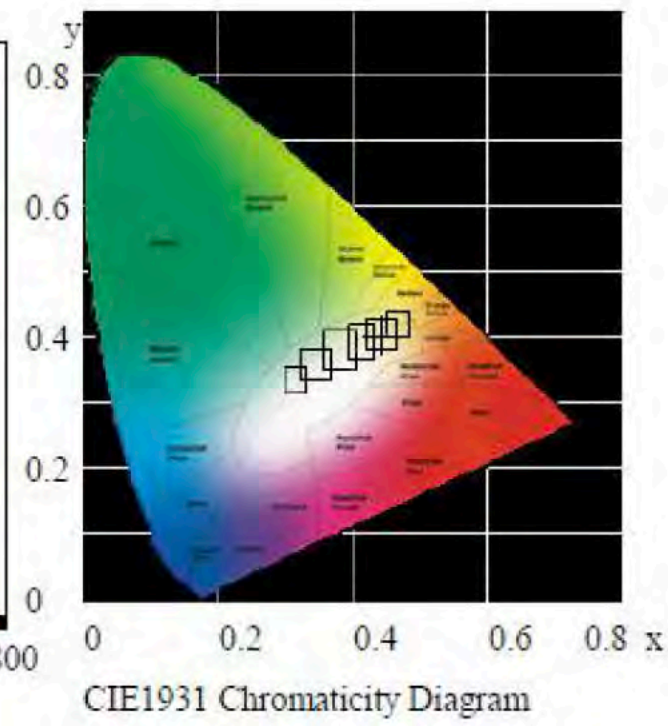
Temperature: 25°C RH: 58%

Spectrum Range: 350-800 nm Scan Step: 5 nm

Spectroradiometric Parameters



Spectral Distribution



CIE1931 Chromaticity Diagram

Chromaticity Coordinates: x=0.4430 y=0.4051 u'=0.254 v'=0.5227

Correlated Color Temperature: 2909 K Dominant Wavelength: 582.0 nm(E)

Colour Fidelity Index: Rf=81 Gamut Index: Rg=97

Luminous Flux: 4228.03 lm Purity: 0.5472

Chromaticity Difference: -0.00037Duv Peak Wavelength: 605.0 nm

Color Ratio: Kr=45.7% Kg=47.4% Kb=6.9%

Bandwidth: 125.7nm Radiant Flux: 13.891 W

Photosynthetically Active Radiation(PAR): 13.23W Photosynthetic Photon Flux(PPF):64.44μmol/s

Rendering Index: Ra=82.2

R1=80	R2=90	R3=97	R4=81	R5=81	R6=88	R7=83	R8=58
R9=6	R10=77	R11=81	R12=72	R13=83	R14=98	R15=73	Re=76

Electric Parameters

Voltage: 120.02 V Current: 0.306 A

Power Factor: 0.993 Power: 36.48 W

Luminous Efficacy: 115.9 lm/W

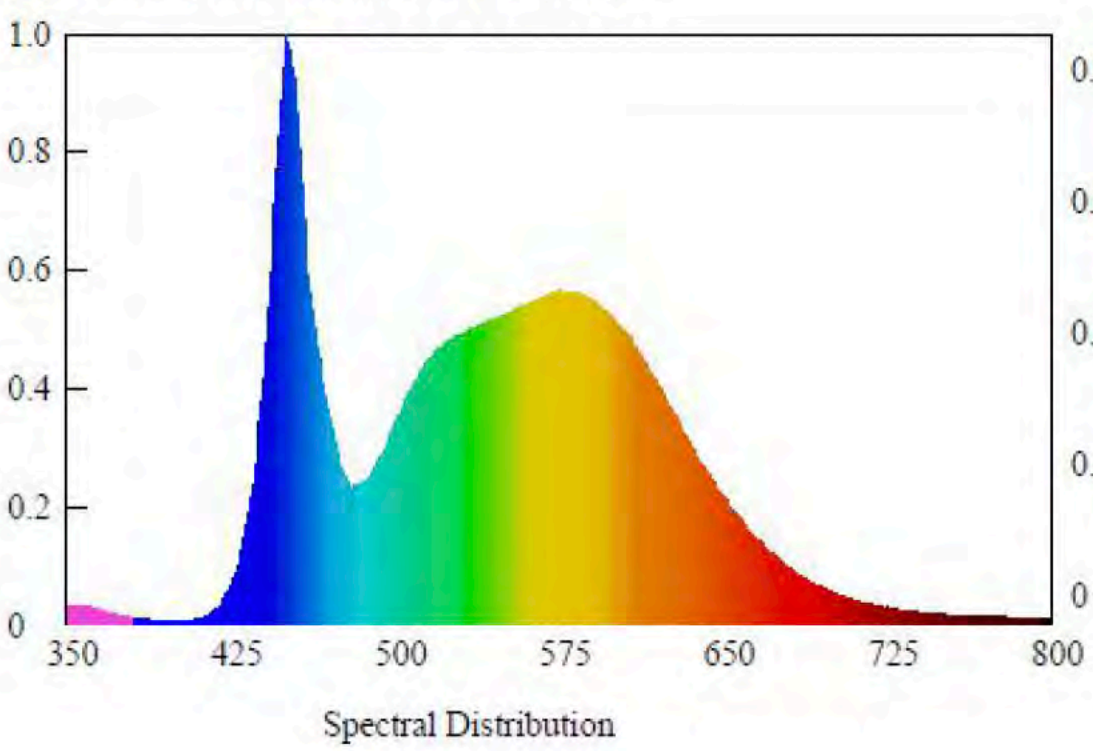
9169X-36-57K

Test Condition

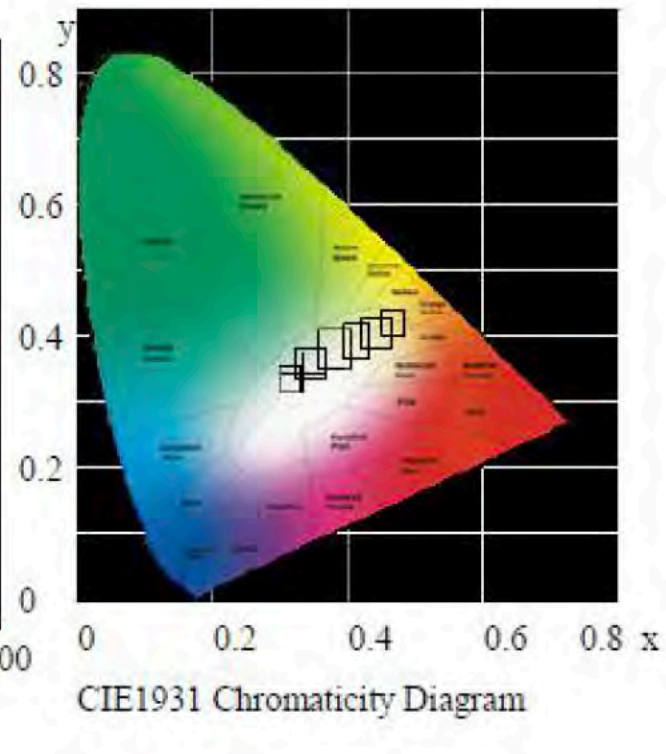
Temperature: 25°C RH: 58%

Spectrum Range: 350-800 nm Scan Step: 5 nm

Spectroradiometric Parameters



Spectral Distribution



CIE1931 Chromaticity Diagram

Chromaticity Coordinates: x=0.3328 y=0.3469 u'=0.2049 v'=0.4805

Correlated Color Temperature: 5488 K Dominant Wavelength: 552.0 nm(E)

Colour Fidelity Index: Rf=79 Gamut Index: Rg=94

Luminous Flux: 4395.84 lm Purity: 0.0393

Chromaticity Difference: +0.00284Duv Peak Wavelength: 450.0 nm

Color Ratio: Kr=32.5% Kg=55.8% Kb=11.7%

Bandwidth: 19.6nm Radiant Flux: 15.516 W

Photosynthetically Active Radiation(PAR): 15.08W Photosynthetic Photon Flux(PPF):68.93μmol/s

Rendering Index: Ra=81.3

R1=79	R2=87	R3=92	R4=81	R5=80	R6=81	R7=86	R8=64
R9=-4	R10=69	R11=80	R12=58	R13=82	R14=96	R15=74	Re=74

Electric Parameters

Voltage: 120.02 V Current: 0.306 A

Power Factor: 0.993 Power: 36.48 W

Luminous Efficacy: 120.5 lm/W

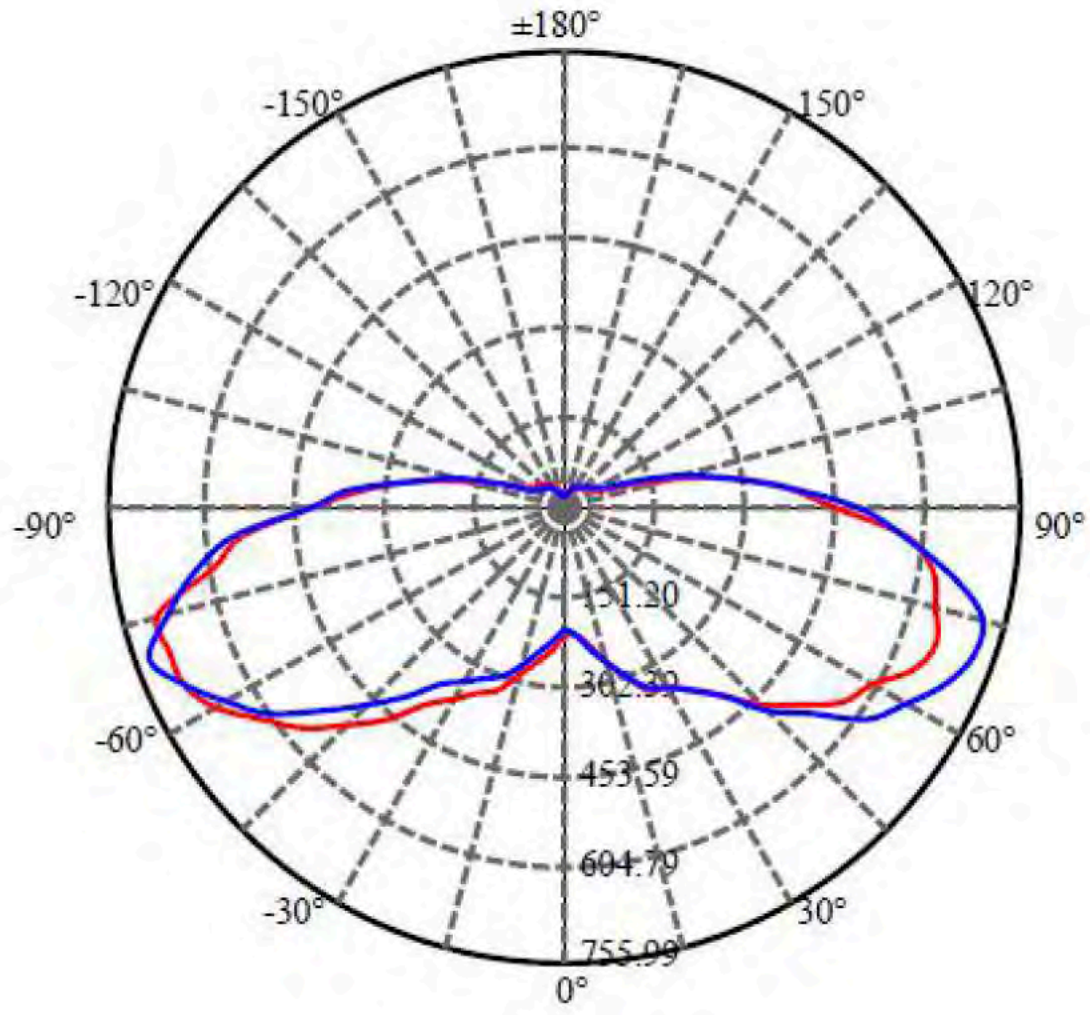
Zonal Flux Diagram

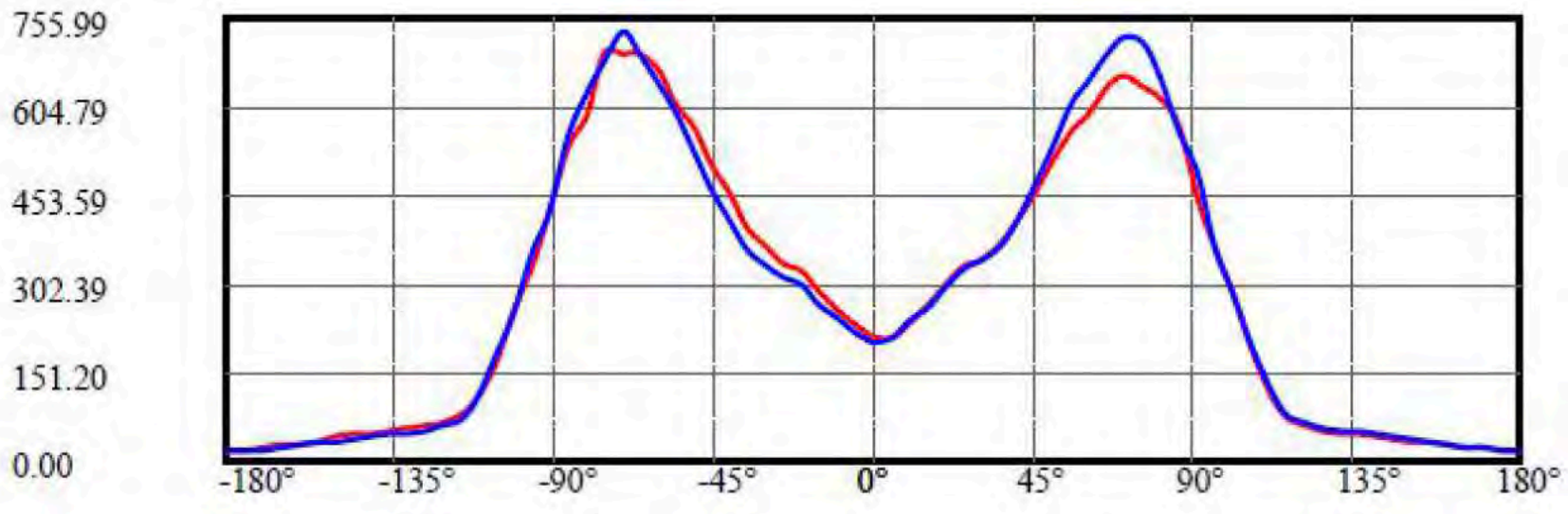
Zonal flux distribution table

γ(°)	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	205.353	.000	.000	.000%	.000%
5.0	217.152	5.051	5.051	.120%	.120%
10.0	241.911	16.422	21.473	.390%	.510%
15.0	268.490	30.277	51.750	.719%	1.229%
20.0	299.747	46.831	98.580	1.112%	2.341%
25.0	324.264	65.447	164.028	1.554%	3.895%
30.0	340.914	84.179	248.206	1.999%	5.894%
35.0	367.580	104.331	352.537	2.478%	8.372%
40.0	410.740	129.857	482.394	3.084%	11.456%
45.0	466.843	162.492	644.885	3.859%	15.314%
50.0	529.495	201.325	846.210	4.781%	20.095%
55.0	590.034	243.423	1089.633	5.781%	25.876%
60.0	645.010	285.477	1375.110	6.779%	32.655%
65.0	694.442	325.623	1700.733	7.733%	40.388%
70.0	712.860	356.338	2057.071	8.462%	48.850%
75.0	694.477	367.855	2424.926	8.736%	57.586%
80.0	637.248	356.333	2781.259	8.462%	66.048%
85.0	569.432	327.884	3109.143	7.786%	73.834%
90.0	454.974	280.491	3389.633	6.661%	80.495%
95.0	363.699	224.159	3613.792	5.323%	85.818%
100.0	271.297	172.544	3786.336	4.097%	89.916%
105.0	192.358	124.061	3910.397	2.946%	92.862%
110.0	115.966	80.591	3990.988	1.914%	94.776%
115.0	76.548	48.746	4039.733	1.158%	95.933%
120.0	62.826	33.882	4073.615	.805%	96.738%
125.0	55.479	27.346	4100.961	.649%	97.387%
130.0	50.974	23.147	4124.107	.550%	97.937%
135.0	47.474	19.893	4144.000	.472%	98.409%
140.0	44.286	16.990	4160.991	.403%	98.813%
145.0	41.029	14.234	4175.225	.338%	99.151%
150.0	37.165	11.515	4186.740	.273%	99.424%
155.0	32.695	8.841	4195.581	.210%	99.634%
160.0	28.346	6.402	4201.982	.152%	99.786%
165.0	24.500	4.355	4206.337	.103%	99.890%
170.0	21.710	2.741	4209.079	.065%	99.955%
175.0	18.591	1.442	4210.521	.034%	99.989%
180.0	19.336	.453	4210.974	.011%	100.000%

Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





C0/C180:

C90/C270:

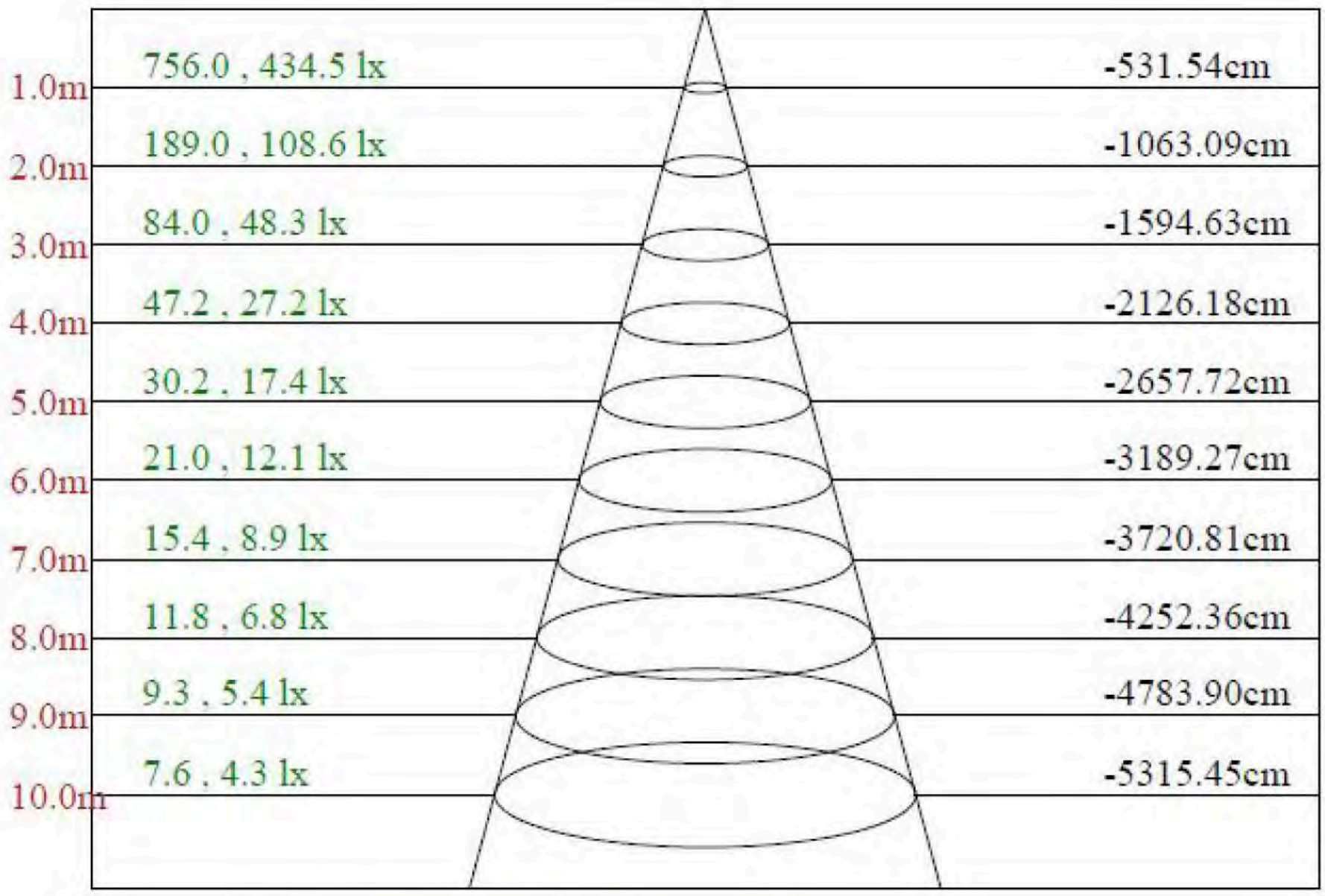
Field angle(10%Imax):C0/180Left:49.2 Right:186.5

:C90/270Left:44.5 Right:188.0

Beam Angle(50%Imax):C0/180Left:24.1 Right:166.1

:C90/270Left:24.2 Right:165.2

Lux distance Curve



Max , Ave Beam angle of C67.5plane221.30

Luminous Intensity Distribution Data

C/γ(°)	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0
0.0	211.80	210.41	237.03	265.86	298.29	335.44	344.03	368.98	408.35
22.5	209.03	206.81	233.70	263.36	291.92	330.45	338.49	357.89	393.10
45.0	206.53	205.98	232.31	260.87	290.25	328.51	339.60	362.88	399.20
67.5	205.42	208.19	235.09	260.87	291.08	328.23	342.09	369.54	409.74
90.0	204.04	212.08	239.80	263.08	294.97	328.23	343.20	367.87	410.01
112.5	203.20	216.51	242.57	265.03	298.29	323.52	340.71	365.93	410.01
135.0	201.82	220.67	244.23	270.85	303.00	321.02	342.09	371.20	419.44
157.5	200.99	222.06	246.45	273.90	305.78	321.86	344.03	372.86	426.37
180.0	211.80	236.47	260.31	290.25	325.18	338.77	365.10	400.86	457.42
202.5	209.03	233.42	255.88	285.26	318.53	331.00	356.51	393.10	442.17
225.0	206.53	229.26	252.83	280.83	311.88	321.86	342.92	373.14	414.45
247.5	205.42	225.11	247.84	272.51	305.22	316.59	337.38	366.21	406.13
270.0	204.04	220.95	242.85	266.97	298.85	313.54	333.78	360.67	407.24
292.5	203.20	215.13	238.69	263.36	293.30	314.93	328.23	354.29	397.81
315.0	201.82	208.19	232.31	258.09	285.82	317.70	330.17	348.47	385.89
337.5	200.99	203.20	228.71	254.77	283.60	316.59	326.29	347.36	384.51
360.0	211.80	210.41	237.03	265.86	298.29	335.44	344.03	368.98	408.35

C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	460.74	512.58	563.59	591.32	640.11	657.85	636.50	622.09	570.80
22.5	445.50	503.16	562.48	602.68	671.99	700.54	682.25	669.77	611.83
45.0	459.64	527.00	599.36	645.37	719.95	749.89	721.33	695.55	652.86
67.5	469.34	530.05	605.45	660.07	721.61	755.99	728.26	664.78	615.43
90.0	474.33	533.93	609.61	650.09	693.61	721.89	715.51	656.46	565.81
112.5	473.77	531.99	591.32	643.43	683.08	690.01	662.84	633.18	538.37
135.0	473.22	520.07	570.80	625.41	680.58	700.26	658.68	616.82	555.28
157.5	483.48	557.77	608.50	676.42	718.84	732.98	724.94	641.77	609.61
180.0	507.59	568.58	609.06	667.00	696.94	697.22	697.22	593.26	536.15
202.5	490.68	560.82	608.78	684.74	716.90	705.81	706.92	609.89	535.87
225.0	468.23	544.74	599.36	678.92	714.13	697.49	705.53	605.45	548.62
247.5	459.64	523.40	576.35	639.00	680.03	704.15	689.45	596.58	544.19
270.0	466.29	524.78	596.86	643.71	693.89	730.48	678.64	627.35	552.78
292.5	456.86	521.18	587.71	646.21	692.78	703.04	691.95	671.16	518.13
315.0	442.72	505.93	574.41	628.19	672.27	706.92	707.75	642.60	561.65
337.5	437.46	505.93	576.90	637.61	714.40	751.27	703.87	649.26	593.53
360.0	460.74	512.58	563.59	591.32	640.11	657.85	636.50	622.09	570.80

C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	446.33	367.60	279.72	195.17	117.27	73.74	60.44	53.23	48.79
22.5	484.59	403.91	306.05	218.17	131.13	79.56	62.10	54.06	49.07
45.0	518.13	423.32	325.46	235.36	141.66	82.89	62.10	54.34	49.35
67.5	499.00	385.62	298.85	211.52	126.41	79.84	64.87	56.28	51.29
90.0	486.25	367.87	280.55	200.99	124.75	82.06	66.81	58.49	53.23
112.5	457.69	362.61	264.75	199.60	125.31	84.00	68.20	60.16	54.89
135.0	436.63	365.38	262.25	189.34	118.37	79.56	67.37	59.60	55.17
157.5	477.10	387.00	294.97	207.92	128.35	85.39	67.92	59.60	55.17
180.0	420.55	331.84	251.44	171.05	109.50	80.12	67.64	60.71	56.28
202.5	425.26	325.46	245.34	162.45	100.08	74.85	65.15	58.22	54.06
225.0	427.75	349.30	255.60	182.14	112.83	79.01	63.21	56.28	52.12
247.5	417.50	344.03	247.84	177.70	110.06	73.74	61.27	54.89	50.45
270.0	420.82	355.40	248.67	182.41	106.18	69.31	59.05	52.40	48.24
292.5	442.17	338.21	241.46	173.54	95.64	66.26	56.55	50.45	46.85
315.0	470.17	351.52	270.29	183.80	105.90	68.47	56.55	49.90	45.74
337.5	449.66	360.11	267.52	186.57	102.02	65.98	56.00	49.07	44.91
360.0	446.33	367.60	279.72	195.17	117.27	73.74	60.44	53.23	48.79

C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	45.19	42.14	38.53	35.21	31.60	27.45	23.84	21.35	17.74
22.5	46.02	42.97	39.64	35.76	31.88	27.72	23.84	21.07	18.30
45.0	46.85	43.52	39.92	36.59	32.44	28.55	24.67	21.90	19.13
67.5	47.96	45.19	42.14	38.26	34.10	29.11	25.23	21.90	18.85
90.0	49.90	46.85	43.80	39.64	34.93	29.94	25.78	22.73	19.13
112.5	51.01	47.68	44.08	39.92	35.21	29.94	25.78	22.46	19.13
135.0	51.01	47.41	43.80	39.64	34.65	29.94	25.78	23.01	18.85
157.5	51.56	47.96	44.36	40.20	34.65	29.94	25.78	22.46	19.13
180.0	52.40	48.51	45.19	40.47	35.21	30.49	26.61	23.84	20.24
202.5	50.18	46.85	43.25	38.81	33.82	29.11	25.50	23.01	20.24
225.0	48.51	45.46	41.86	37.43	32.44	28.55	24.40	22.18	19.96
247.5	46.30	43.52	40.47	36.32	31.88	27.72	24.12	21.35	18.57
270.0	44.63	41.86	38.81	34.93	30.77	27.45	23.56	20.51	17.47
292.5	43.80	40.47	37.98	34.38	30.22	26.06	22.46	19.68	17.19
315.0	42.42	39.09	36.59	33.54	29.66	25.78	22.18	19.68	16.91
337.5	41.86	39.09	36.04	33.54	29.66	25.78	22.46	20.24	16.63
360.0	45.19	42.14	38.53	35.21	31.60	27.45	23.84	21.35	17.74

C/γ(°)	180.0
0.0	19.41
22.5	19.96
45.0	19.41
67.5	19.13
90.0	19.13
112.5	19.13
135.0	19.68
157.5	18.85
180.0	19.41
202.5	19.96
225.0	19.41
247.5	19.13
270.0	19.13
292.5	19.13
315.0	19.68
337.5	18.85
360.0	19.41

Photo Document

****End of test report****