



Shenzhen Belling Efficiency Testing Lab Co.,Ltd



Report No.:BL181119006-9

Date of issue 2018-11-19
Version 1.0
Total pages 15

**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:

High Bay Luminaires for Commercial and Industrial Buildings

Model No.:

903XX-240W-30K, 90392, 903XX-240W-57K

Test laboratory: Shenzhen Belling Efficiency Testing Lab Co.,Ltd, 1Floor, No.1 Building, Meibaohe Industrial Park, Dalang Street, Longhua District, Shenzhen, Guangdong Prov.518101 China.

Complied by: Zac Kuang

Review by: Jason Zhou

Project Engineer

Technical Manager

Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or use in part without prior written consent from Shenzhen Belling Efficiency Testing Lab Co.,Ltd. This report must not be used by the customer to claim product certification, approval, or endorsement By NVLAP, NIST, or any agency of the U.S. Government.



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	High Bay Luminaires for Commercial and Industrial Buildings
Model Number	903XX-240W-30K, 90392, 903XX-240W-57K
Rated Inputs	AC 200-480V 50/60Hz
Rated Power	240 W
Nominal CCT	3000K / 5700K
Date of Receipt Samples	2018-09-17
Date of test	2018-09-17 to 2018-09-25

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 Description

- Declaration: Shenzhen Huadian Lighting Co.,LTD. declare that their product with model HL-HBS24W24C1BUP-3000KC / HL-HBS24W24C1BUP-5700KC are the same to the product in the report BL180927016-9 and is authorized by original applicant to use their test data.
- Note: All the data in previous report BL180927016-9 is shared in report.



1.4 Equipment list

Device	Manufacture	Model No.	Serial No.	Calibration due date
Goniophotometric System	SENSING	GMS-3000	N.A	2019-04-09
AC Power Source	ALL POWER	APW-110N	992257	2019-04-25
Total Luminous Flux Standard Lamp	SENSING	110V/200W	S1520062	2019-04-14
Total Spectral Radiant Flux Standard Lamp	SENSING	12V/20W	LSD12201731	2019-04-16
Digital Power Meter	YOKOGAWA	WT310	C2QM02030V	2019-04-09
Integral Sphere	SENSING	SPR-600M	N.A	2019-05-31
Digital Power Meter	YOKOGAWA	WT210	91L929742	2019-04-09
Optical Color and Electrical Measurement System	SENSING	SPR-3000	S1101108	2019-04-09
Environment Measurer	KTJ	HTC-1	N/A	2019-06-23
Environment Measurer	KTJ	TA218B	N/A	2019-06-23
Electronic clock	CHUANGRONG	QUARTZ	823	2019-07-19
Digital Anemometer	TECMAN	TD8901	026141	2019-09-11

Statement of Traceability: Shenzhen Belling Efficiency Testing Lab Co.,Ltd 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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, 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

3.1.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
903XX-240W-30K	277.04	60	0.877	240.63	0.990
903XX-240W-57K	277.02	60	0.879	241.03	0.990

3.1.2 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
903XX-240W-30K	30463.76	126.6	2999	82.8	8
903XX-240W-57K	31550.83	130.9	5762	83.9	25

3.1.3 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
903XX-240W-30K	+0.00103	0.4385	0.4072	0.2502	0.5228
903XX-240W-57K	+0.00252	0.3266	0.3408	0.2030	0.4765

3.2 Goniophotometer System

3.2.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
903XX-240W-30K	277.06	60	0.8765	240.32	0.9896

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 20-50°(%lm)
30421.70	126.59	53.186



3.3 Additional Test

Model Number	Test Item	Test Voltage (V)	Frequency(Hz)	Test Result
903XX-240W-30K	Power Factor	480	60	0.946
	THD	480	60	9.4%



4 Test Data

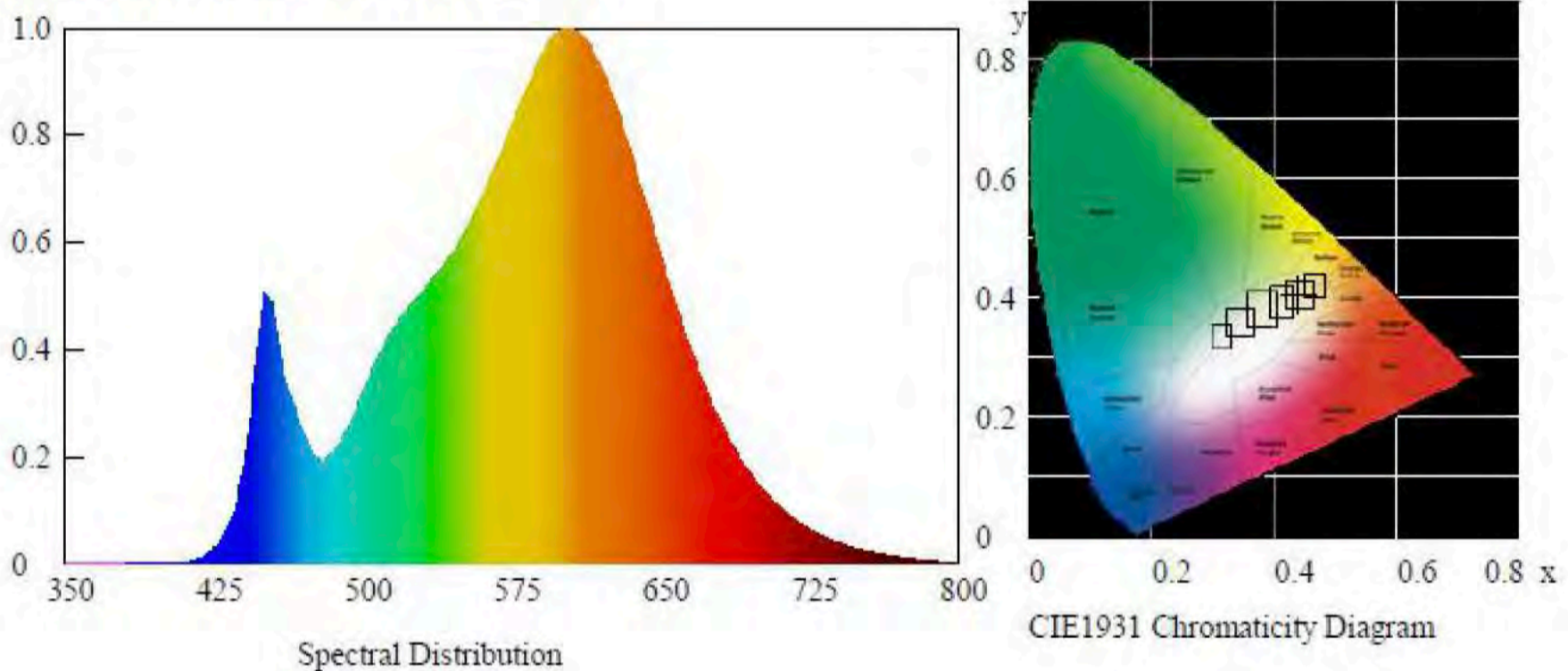
903XX-240W-30K

Test Condition

Temperature: 25°C
Spectrum Range: 350-800 nm

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: $x=0.4385$ $y=0.4072$ $u'=0.2502$ $v'=0.5228$

Correlated Color Temperature: 2999 K

Dominant Wavelength: 581.0 nm(E)

Colour Fidelity Index: $R_f=83$

Gamut Index: $R_g=94$

Luminous Flux: 30463.76 lm

Purity: 0.5402

Chromaticity Difference: +0.00103Duv

Peak Wavelength: 600.0 nm

Color Ratio: $K_r=44.8\%$ $K_g=47.8\%$ $K_b=7.3\%$

Bandwidth: 130.2nm

Radiant Flux: 77.777 W

Rendering Index: $R_a=82.8$

$R_1=81$ $R_2=91$ $R_3=97$ $R_4=81$ $R_5=81$ $R_6=89$ $R_7=83$ $R_8=59$

$R_9=8$ $R_{10}=80$ $R_{11}=80$ $R_{12}=70$ $R_{13}=84$ $R_{14}=99$ $R_{15}=74$ $R_e=77$

Electric Parameters

Voltage: 277.04 V

Current: 0.877 A

Power Factor: 0.990

Power: 240.63 W

Luminous Efficacy: 126.6 lm/W

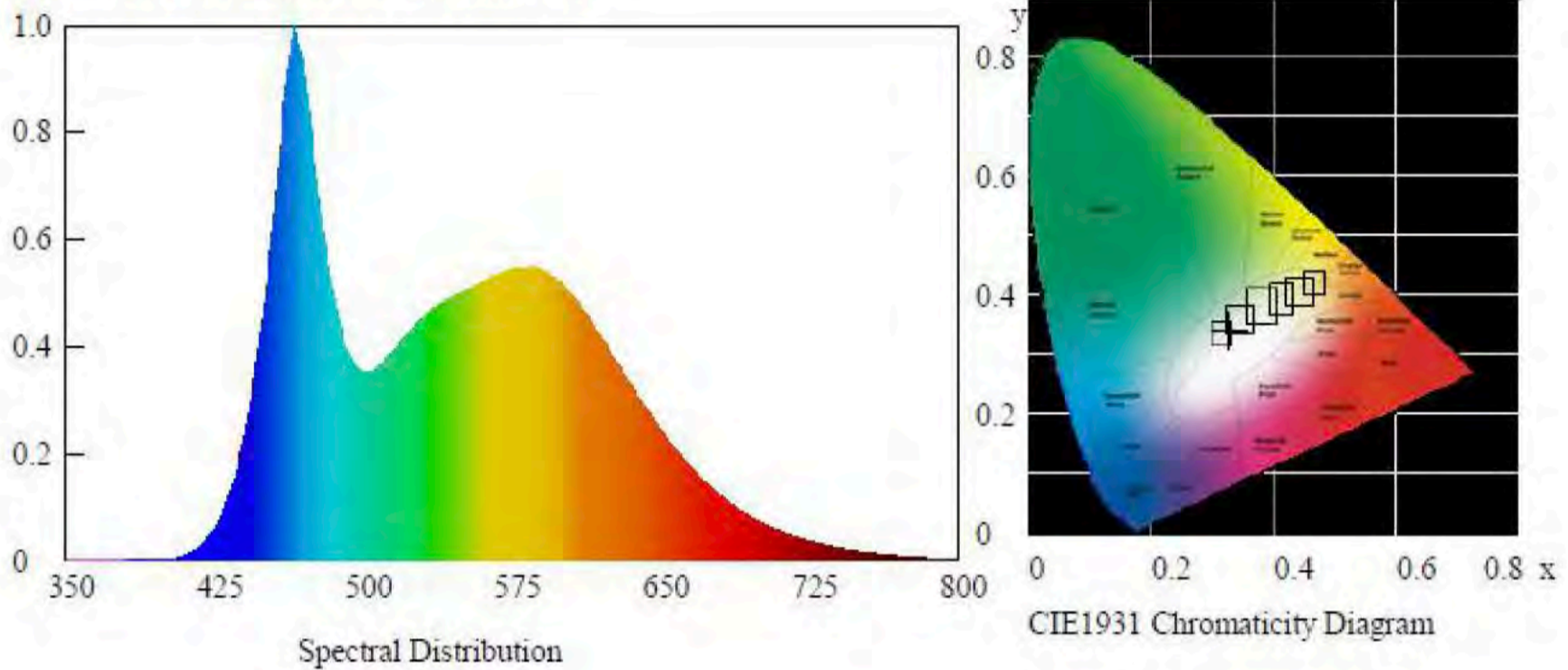
**903XX-240W-57K****Test Condition**

Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

Spectroradiometric ParametersChromaticity Coordinates: $x=0.3266$ $y=0.3408$ $u'=0.203$ $v'=0.4765$

Correlated Color Temperature: 5762 K

Dominant Wavelength: 507.0 nm(E)

Colour Fidelity Index: $R_f=78$ Gamut Index: $R_g=87$

Luminous Flux: 31550.83 lm

Purity: 0.0206

Chromaticity Difference: +0.00252Duv

Peak Wavelength: 465.0 nm

Color Ratio: $K_r=33.0\%$ $K_g=53.3\%$ $K_b=13.7\%$

Bandwidth: 39.1nm

Radiant Flux: 74.446 W

Rendering Index: $R_a=83.9$

R1=87 R2=99 R3=88 R4=74 R5=84 R6=93 R7=80 R8=67

R9=25 R10=98 R11=73 R12=69 R13=93 R14=94 R15=82 Re=80

Electric Parameters

Voltage: 277.02 V

Current: 0.879 A

Power Factor: 0.990

Power: 241.03 W

Luminous Efficacy: 130.9 lm/W

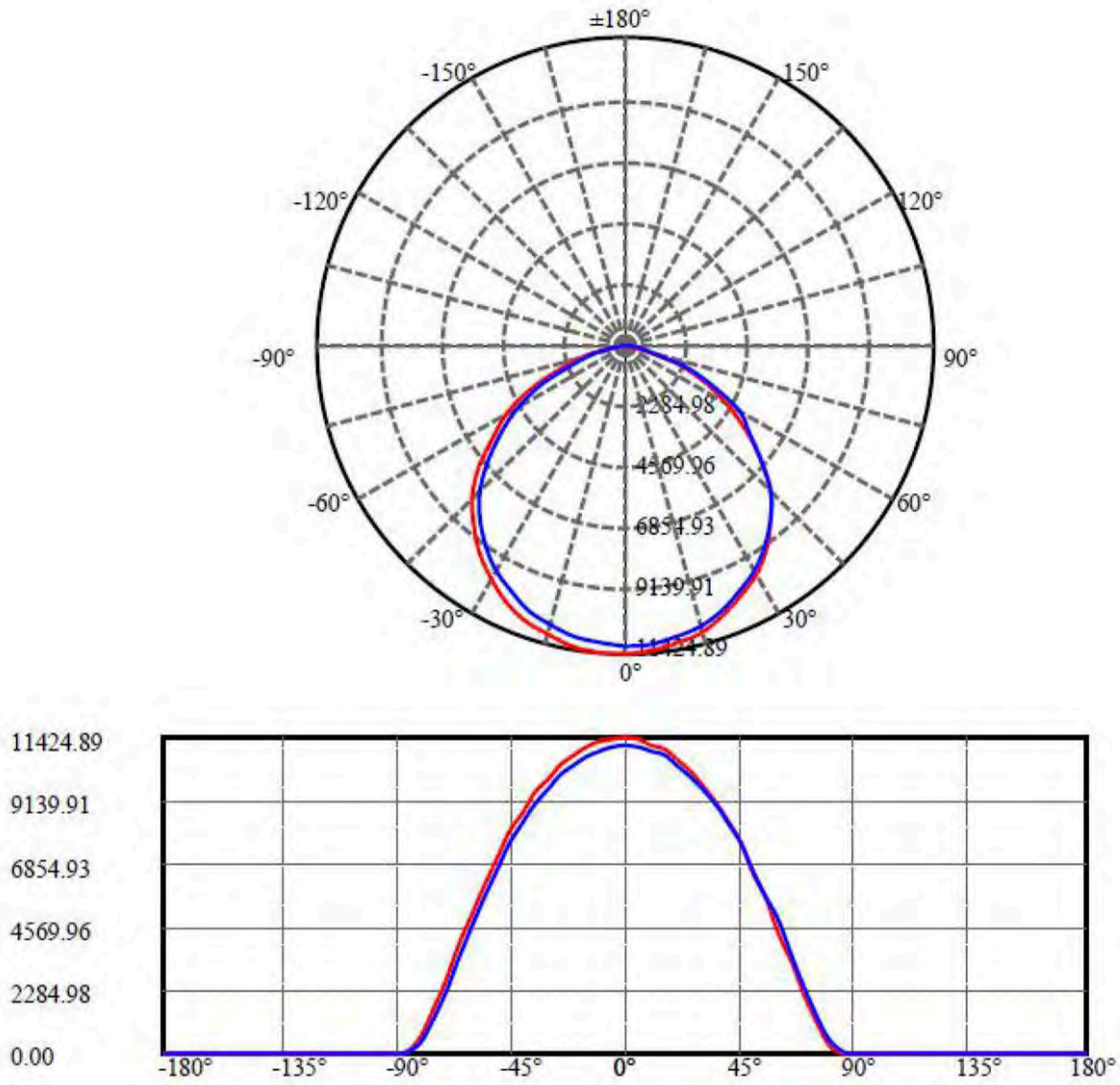
**Zonal Flux Diagram**

Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	11167.270	.000	.000	.000%	.000%
5.0	11119.210	266.429	266.429	.876%	.876%
10.0	10987.950	790.843	1057.271	2.600%	3.475%
15.0	10784.800	1291.544	2348.815	4.245%	7.721%
20.0	10488.240	1753.197	4102.012	5.763%	13.484%
25.0	10102.080	2159.545	6261.557	7.099%	20.583%
30.0	9624.704	2496.442	8757.998	8.206%	28.789%
35.0	9059.907	2751.440	11509.440	9.044%	37.833%
40.0	8404.564	2913.815	14423.250	9.578%	47.411%
45.0	7631.716	2969.248	17392.500	9.760%	57.171%
50.0	6669.330	2889.735	20282.230	9.499%	66.670%
55.0	5669.090	2682.783	22965.020	8.819%	75.489%
60.0	4622.966	2378.980	25344.000	7.820%	83.309%
65.0	3488.472	1971.906	27315.900	6.482%	89.791%
70.0	2344.230	1476.878	28792.780	4.855%	94.646%
75.0	1294.864	951.201	29743.980	3.127%	97.772%
80.0	453.825	467.900	30211.880	1.538%	99.310%
85.0	57.705	138.995	30350.880	.457%	99.767%
90.0	4.725	17.094	30367.970	.056%	99.823%
95.0	3.894	2.360	30370.330	.008%	99.831%
100.0	3.935	2.127	30372.460	.007%	99.838%
105.0	4.452	2.244	30374.700	.007%	99.846%
110.0	5.528	2.609	30377.310	.009%	99.854%
115.0	6.726	3.103	30380.410	.010%	99.864%
120.0	8.142	3.615	30384.030	.012%	99.876%
125.0	9.354	4.044	30388.070	.013%	99.889%
130.0	10.539	4.325	30392.400	.014%	99.904%
135.0	11.574	4.468	30396.870	.015%	99.918%
140.0	12.500	4.457	30401.330	.015%	99.933%
145.0	13.316	4.307	30405.630	.014%	99.947%
150.0	13.916	4.010	30409.640	.013%	99.960%
155.0	14.406	3.584	30413.230	.012%	99.972%
160.0	14.420	3.023	30416.250	.010%	99.982%
165.0	14.311	2.368	30418.620	.008%	99.990%
170.0	14.243	1.694	30420.310	.006%	99.995%
175.0	14.447	1.026	30421.340	.003%	99.999%
180.0	15.386	.357	30421.690	.001%	100.000%



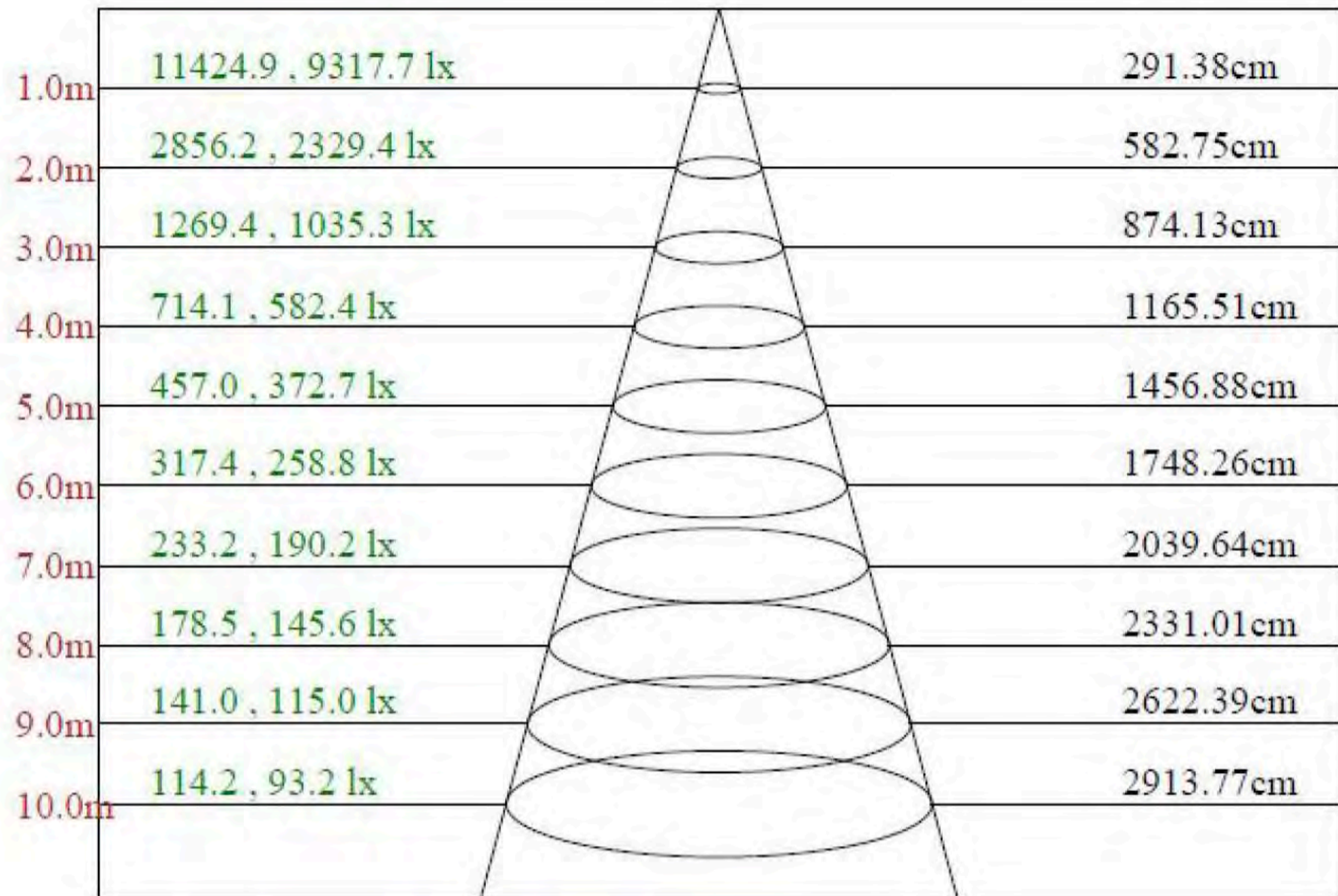
Luminous Intensity Distribution Diagram Light Distribution Curve [Unit:cd]



C0/C180: —
C90/C270: —
Field angle(10%Imax):C0/180Left:77.2 Right:74.7
 :C90/270Left:75.6 Right:76.2
Beam Angle(50%Imax):C0/180Left:56.6 Right:54.1
 :C90/270Left:55.4 Right:55.5



Lux distance Curve



Max , Ave Beam angle of C0plane110.99

**Luminous Intensity Distribution Data**

<i>C/γ</i> (°)	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0
0.0	11424.89	11324.67	11170.00	10971.74	10644.96	10226.67	9727.78	9115.60	8427.17
22.5	11276.75	11196.14	11058.89	10841.03	10527.31	10102.49	9603.60	9019.74	8344.38
45.0	11204.85	11124.25	11004.42	10782.21	10444.53	10069.81	9549.14	8978.35	8305.17
67.5	11115.53	11106.82	10960.85	10749.53	10455.42	10041.49	9553.49	8993.60	8320.42
90.0	11115.53	11076.32	10949.96	10753.89	10442.35	10034.96	9581.81	9019.74	8361.81
112.5	11087.21	11058.89	10930.35	10727.74	10431.46	10052.38	9581.81	9052.42	8405.38
135.0	11056.71	11041.46	10912.92	10727.74	10444.53	10069.81	9612.31	9058.96	8451.13
157.5	11056.71	11058.89	10915.10	10738.64	10470.67	10102.49	9662.42	9124.31	8477.27
180.0	11424.89	11366.07	11285.46	11093.75	10808.35	10457.60	9967.42	9407.53	8756.13
202.5	11276.75	11226.64	11126.42	10954.32	10686.35	10342.14	9865.03	9307.31	8675.53
225.0	11204.85	11170.00	11054.53	10865.00	10583.96	10226.67	9782.24	9220.17	8555.70
247.5	11115.53	11109.00	10978.28	10780.03	10520.78	10143.89	9653.71	9085.10	8464.20
270.0	11115.53	11054.53	10939.07	10725.57	10431.46	10043.67	9590.53	9026.28	8368.35
292.5	11087.21	11019.67	10875.89	10655.85	10353.03	9973.96	9481.60	8928.24	8270.31
315.0	11056.71	10995.71	10834.49	10603.57	10300.74	9888.99	9420.60	8830.21	8165.74
337.5	11056.71	10978.28	10810.53	10586.14	10265.89	9856.31	9361.78	8790.99	8124.35
360.0	11424.89	11324.67	11170.00	10971.74	10644.96	10226.67	9727.78	9115.60	8427.17
<i>C/γ</i> (°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	7592.77	6540.52	5538.38	4327.52	3266.56	2139.36	1084.28	317.85	26.14
22.5	7490.38	6442.49	5468.66	4336.46	3257.84	2077.49	1070.33	313.72	29.41
45.0	7435.92	6451.20	5496.98	4322.73	3280.72	2168.34	1134.82	349.01	32.46
67.5	7509.99	6520.91	5540.55	4328.18	3394.22	2248.29	1196.69	403.47	39.65
90.0	7594.95	6601.52	5629.88	4832.52	3504.24	2382.71	1303.88	482.12	58.17
112.5	7669.02	6740.95	5760.59	4764.98	3613.17	2538.26	1446.14	553.36	78.65
135.0	7734.38	6878.20	5817.23	4839.05	3739.74	2620.39	1533.72	637.23	106.53
157.5	7762.70	6958.81	5891.31	4893.52	3845.84	2715.60	1613.67	670.35	118.08
180.0	8011.06	7096.06	6037.27	5004.63	3871.77	2699.69	1542.87	631.79	98.69
202.5	7930.45	6965.34	5969.73	4934.91	3760.66	2619.08	1514.55	588.87	89.54
225.0	7812.81	6858.59	5869.52	4852.13	3697.48	2534.12	1449.19	548.13	78.21
247.5	7721.31	6740.95	5786.73	4771.52	3568.94	2414.30	1340.26	474.93	56.21
270.0	7603.67	6655.99	5636.41	4616.84	3436.05	2277.05	1209.55	408.48	40.09
292.5	7507.81	6507.84	5525.31	4501.37	3309.69	2118.01	1109.33	336.81	29.63
315.0	7411.95	6422.88	5414.20	4361.95	3181.16	2024.33	1094.08	292.15	22.00
337.5	7318.27	6327.02	5322.70	4279.16	3087.48	1930.65	1074.47	252.93	19.83
360.0	7592.77	6540.52	5538.38	4327.52	3266.56	2139.36	1084.28	317.85	26.14
<i>C/γ</i> (°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	3.92	3.05	3.49	4.14	5.23	6.54	8.06	8.93	10.24
22.5	4.14	3.92	4.14	4.79	5.66	6.97	8.71	9.80	11.11
45.0	4.36	3.92	4.14	4.79	5.88	7.19	8.50	9.59	11.11
67.5	4.58	4.14	4.14	4.58	5.66	6.75	8.50	9.59	10.89
90.0	4.79	3.92	4.14	4.36	5.66	6.75	8.50	9.37	10.46
112.5	4.79	4.14	3.92	4.36	5.45	6.54	8.06	9.37	10.24
135.0	5.66	3.92	3.92	4.14	5.23	6.32	7.84	8.93	10.46
157.5	7.19	3.92	3.92	4.36	5.23	6.32	7.63	9.15	10.02
180.0	4.79	3.70	3.70	3.70	4.79	6.32	7.41	8.71	10.02
202.5	5.23	3.92	3.70	4.14	5.23	6.54	7.84	9.15	10.24
225.0	4.79	4.14	3.70	4.36	5.45	6.54	7.63	9.15	10.24
247.5	4.58	3.92	3.92	4.36	5.45	6.75	7.84	9.37	10.24
270.0	4.36	3.92	3.92	4.58	5.66	6.97	8.06	9.37	10.89
292.5	4.14	3.70	3.92	4.79	5.88	6.97	8.28	9.80	10.68
315.0	4.14	4.14	3.92	4.79	5.88	7.19	8.71	9.80	11.11
337.5	4.14	3.92	4.36	5.01	6.10	6.97	8.71	9.59	10.68
360.0	3.92	3.05	3.49	4.14	5.23	6.54	8.06	8.93	10.24



C/γ(°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	11.33	12.42	13.07	13.94	13.94	14.16	13.73	13.51	13.94
22.5	11.98	12.85	13.73	14.38	14.60	14.81	14.60	14.38	14.81
45.0	11.98	12.85	13.73	14.16	14.81	14.60	14.60	14.60	14.81
67.5	11.76	12.85	13.51	13.94	14.38	14.60	14.16	14.38	14.60
90.0	11.55	12.64	13.29	13.94	14.38	14.60	14.38	14.38	14.38
112.5	11.55	12.20	13.29	13.73	14.38	14.38	14.16	14.16	14.60
135.0	11.33	12.20	13.07	13.73	14.16	14.16	14.38	14.16	14.60
157.5	11.33	12.20	12.85	13.51	14.38	14.38	14.16	14.16	14.60
180.0	11.11	11.76	13.07	13.51	14.38	14.16	14.38	14.16	14.38
202.5	11.33	12.42	13.29	13.94	14.38	14.16	14.16	14.16	14.38
225.0	11.55	12.42	13.29	13.94	14.38	14.38	13.94	14.38	14.38
247.5	11.33	12.42	13.29	13.94	14.38	14.38	14.38	14.38	14.38
270.0	11.76	12.64	13.29	13.73	14.38	14.60	14.38	14.16	14.38
292.5	11.76	12.64	13.29	13.94	14.38	14.38	14.60	14.38	14.16
315.0	11.76	12.64	13.51	14.16	14.60	14.60	14.38	14.16	14.38
337.5	11.76	12.85	13.51	14.16	14.60	14.38	14.60	14.38	14.38
360.0	11.33	12.42	13.07	13.94	13.94	14.16	13.73	13.51	13.94
C/γ(°)	180.0								
0.0	15.03								
22.5	15.47								
45.0	15.47								
67.5	15.47								
90.0	15.47								
112.5	15.25								
135.0	15.47								
157.5	15.47								
180.0	15.03								
202.5	15.47								
225.0	15.47								
247.5	15.47								
270.0	15.47								
292.5	15.25								
315.0	15.47								
337.5	15.47								
360.0	15.03								



5 Performance Assessment

Model name	CCT(K)	Total Luminous(lm)	Power(W)	Luminous Efficacy(lm/W)
903XX-240W-30K	3000K	30463.76	240.63	126.6
903XX-240W-35K	3500K	30681.17 *1	240.83 *2	127.4 *3
903XX-240W-40K	4000K	30898.59 *1	240.83 *2	128.3 *3
903XX-240W-45K	4500K	31116.00 *1	240.83 *2	129.2 *3
90392	5000K	31333.42 *1	240.83 *2	130.1 *3
903XX-240W-57K	5700K	31550.83	241.03	130.9

*1: This value is calculated and the calculation formula is as below:

$$30681.17=(31550.83-30463.76) /5+30463.76$$

$$30898.59=(31550.83-30463.76) /5+30681.17$$

$$31116.00=(31550.83-30463.76) /5+30898.59$$

$$31333.42=(31550.83-30463.76) /5+31116.00$$

*2: This value is calculated and the calculation formula is as below:

$$240.83=(240.63+241.03)/2$$

*3: This value is calculated and the calculation formula is as below:

$$127.4=30681.17 /240.83$$

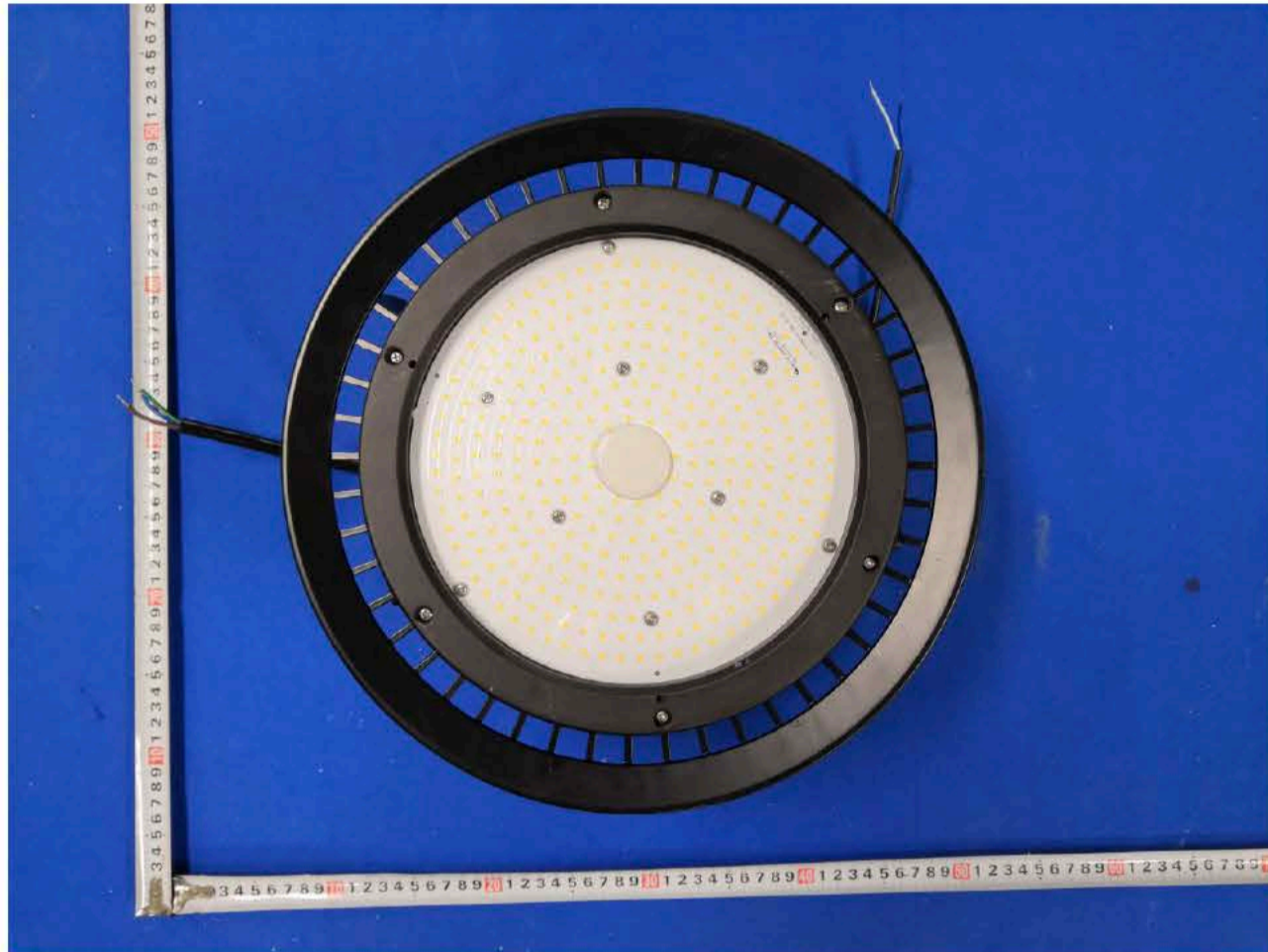
$$128.3=30898.59 /240.83$$

$$129.2=31116.00 /240.83$$

$$130.1=31333.42 /240.83$$



Photo Document



End of test report