



Shenzhen Belling Efficiency Testing Lab



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Test report of

IES LM-79-08

Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Applicant:

MaxLite Inc.

Address:

10 York Ave West Caldwell, NJ. 07006

For Product:

2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces

Model No.:

LRK22D3035 / LRK22D3041 / LRK22D3050

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

Complied by: Zac Kuang

Review by: Jason Zhou

Project Engineer

Technical Manager

Note: 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. This report must not be used by the customer to claim product certification, approval, or endorsement By NVLAP, NIST, or any agency of the Federal Government.



1 General

1.1 Product Information

Manufacturer	MaxLite Inc.
Manufacturer Address	10 York Ave West Caldwell, NJ. 07006
Brand Name	MaxLite
Luminaire Type	2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces
Model Number	LRK22D3035 / LRK22D3041 / LRK22D3050
Rated Inputs	AC 100-277V 50/60Hz
Rated Power	30 W
Nominal CCT	3500K / 4100K / 5000K
Date of Receipt Samples	2017-06-20

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
Goniophotometric System	SENSING	GMS-3000	N.A	2017-09-21
AC Power Source	ALL POWER	APW-110N	992257	2017-08-27
Total Luminous Flux Standard Lamp	SENSING	110V/100W	S13100234	2017-09-15
Digital Power Meter	YOKOGAWA	WT310	C2QM02030V	2017-08-29
Integral Sphere	SENSING	SPR-600M	N.A	2017-08-27
Digital Power Meter	YOKOGAWA	WT210	91L929742	2017-08-29
Optical Color and Electrical Measurement System	SENSING	SPR-3000	N.A	2017-08-27
Temperature/humidity/clock	VICTOR	VC230	57636	2017-09-13
Digital Anemometer	TECMAN	TD8901	026141	2017-09-13

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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, 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
LRK22D3035	120.01	60	0.232	27.523	0.989
LRK22D3041	120.02	60	0.234	27.762	0.990
LRK22D3050	120.01	60	0.233	27.652	0.991

3.1.2 Additional Test

Test Item	Model	Test Voltage (V)	Frequency (Hz)	Test Result
Power factor	LRK22D3035	120	60	0.989
		277	60	0.923
	LRK22D3041	120	60	0.990
		277	60	0.927
	LRK22D3050	120	60	0.991
		277	60	0.931
Total harmonic distortion	LRK22D3035	120	60	9.2%
		277	60	13.5%
	LRK22D3041	120	60	10.1%
		277	60	14.6%
	LRK22D3050	120	60	11.4%
		277	60	15.7%
Off state power (W)	LRK22D3035	120	60	0
	LRK22D3035	277	60	0



3.1.3 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
LRK22D3035	2678.511	97.319	3463	80.5	0
LRK22D3041	2737.972	98.623	3984	81.7	5
LRK22D3050	2763.845	99.951	4876	83.0	8

3.1.4 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
LRK22D3035	0.0018	0.4094	0.3969	0.2358	0.5144
LRK22D3041	0.0023	0.3828	0.3832	0.2241	0.5047
LRK22D3050	0.0024	0.3493	0.3598	0.2111	0.4892

3.2 Goniophotometer System

3.2.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
LRK22D3035	120.08	60	0.2281	27.1120	0.9899

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	S/MH (C0/180)	S/MH (C90/270)	Zonal Lumen in 0-60°(%lm)
2643.47	97.50	1.34	1.28	78.775



4 Test Data

LRK22D3035

Test Condition

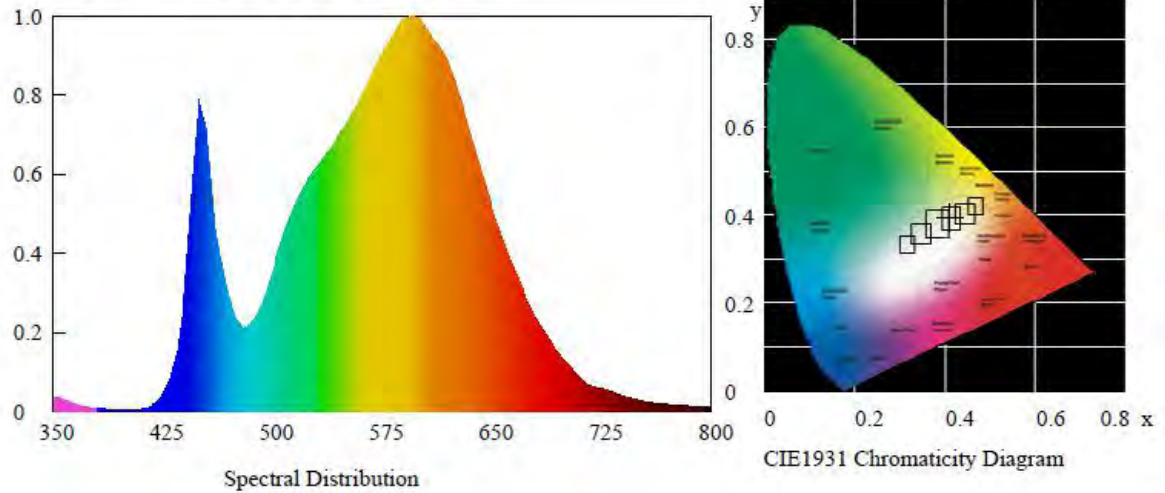
Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

Spectroradiometric Parameters

Chromaticity Coordinates: $x=0.4094$ $y=0.3969$ $u'=0.2358$ $v'=0.5144$

Correlated Color Temperature: 3463 K

Dominant Wavelength: 579.0 nm(E)

Luminous Flux: 2678.511 lm

Purity: 0.4206

Chromaticity Difference: 0.0018Duv

Peak Wavelength: 694.1 nm

Color Ratio: $K_r=40.9\%$ $K_g=51.2\%$ $K_b=7.9\%$

Bandwidth: 116.9nm

Radiant Flux: 8.115 W

Rendering Index: $R_a=80.5$

R1=78 R2=88 R3=95 R4=79 R5=78 R6=83 R7=84 R8=59

R9=0 R10=71 R11=77 R12=59 R13=81 R14=97 R15=71

Electric Parameters

Voltage: 120.01 V

Current: 0.232 A

Power Factor: 0.989

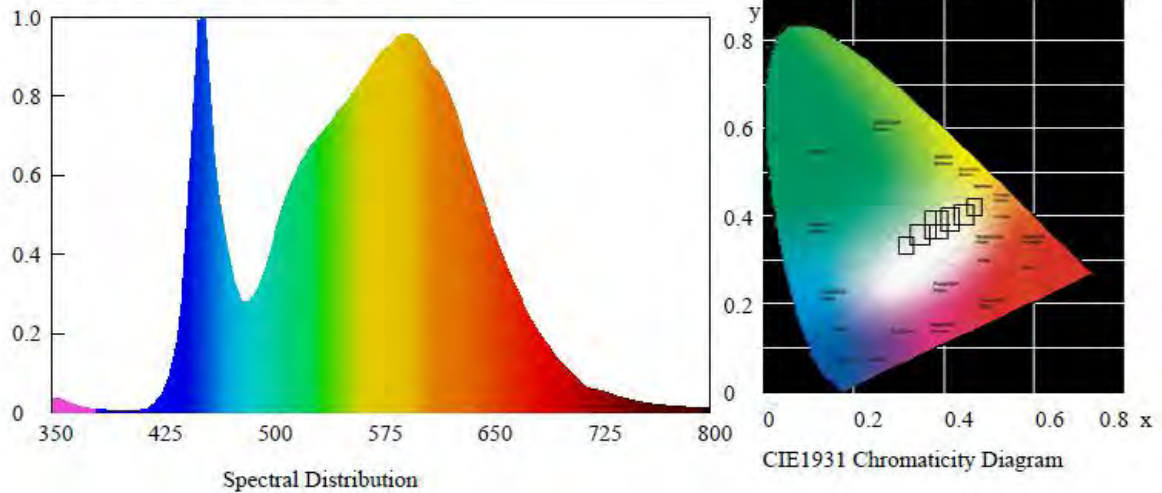
Power: 27.523 W

Luminous Efficacy: 97.319 lm/W

**LRK22D3041****Test Condition**

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

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters

Chromaticity Coordinates: $x=0.3828$ $y=0.3832$ $u'=0.2241$ $v'=0.5047$

Correlated Color Temperature: 3984 K

Dominant Wavelength: 576.0 nm(E)

Luminous Flux: 2737.972 lm

Purity: 0.2987

Chromaticity Difference: 0.0023Duv

Peak Wavelength: 447.9 nm

Color Ratio: $K_r=37.9\%$ $K_g=53.0\%$ $K_b=9.2\%$

Bandwidth: -444.5nm

Radiant Flux: 8.396 W

Rendering Index: $R_a=81.7$

$R_1=80$ $R_2=88$ $R_3=95$ $R_4=80$ $R_5=79$ $R_6=83$ $R_7=86$ $R_8=63$

$R_9=5$ $R_{10}=72$ $R_{11}=78$ $R_{12}=56$ $R_{13}=83$ $R_{14}=97$ $R_{15}=73$

Electric Parameters

Voltage: 120.02 V

Current: 0.234 A

Power Factor: 0.990

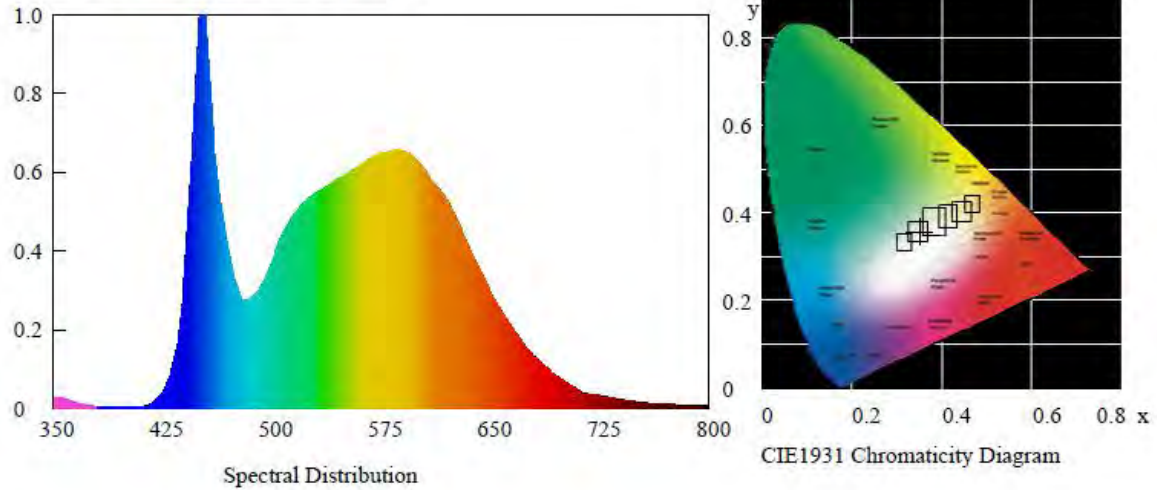
Power: 27.762 W

Luminous Efficacy: 98.623 lm/W

**LRK22D3050****Test Condition**

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

RH: 58%
Scan Step: 5 nm

Spectroradiometric Parameters

Chromaticity Coordinates: $x=0.3493$ $y=0.3598$ $u'=0.2111$ $v'=0.4892$

Correlated Color Temperature: 4876 K

Dominant Wavelength: 571.0 nm(E)

Luminous Flux: 2763.845 lm

Purity: 0.1278

Chromaticity Difference: 0.0024Duv

Peak Wavelength: 448.2 nm

Color Ratio: $K_r=34.4\%$ $K_g=54.4\%$ $K_b=11.1\%$

Bandwidth: -445.1nm

Radiant Flux: 8.723 W

Rendering Index: $R_a=83.0$

$R_1=81$ $R_2=90$ $R_3=94$ $R_4=80$ $R_5=81$ $R_6=84$ $R_7=87$ $R_8=66$

$R_9=8$ $R_{10}=75$ $R_{11}=79$ $R_{12}=55$ $R_{13}=84$ $R_{14}=97$ $R_{15}=76$

Electric Parameters

Voltage: 120.01 V

Current: 0.233 A

Power Factor: 0.991

Power: 27.652 W

Luminous Efficacy: 99.951 lm/W



Zonal Flux Diagram

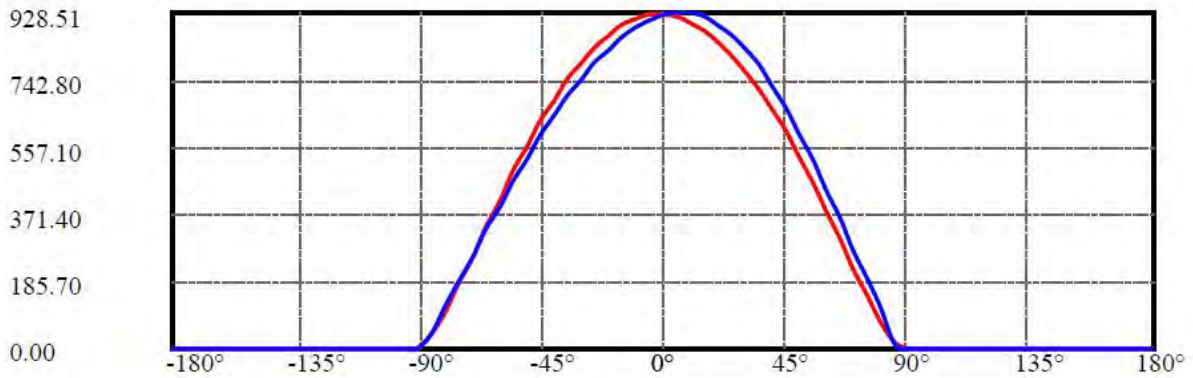
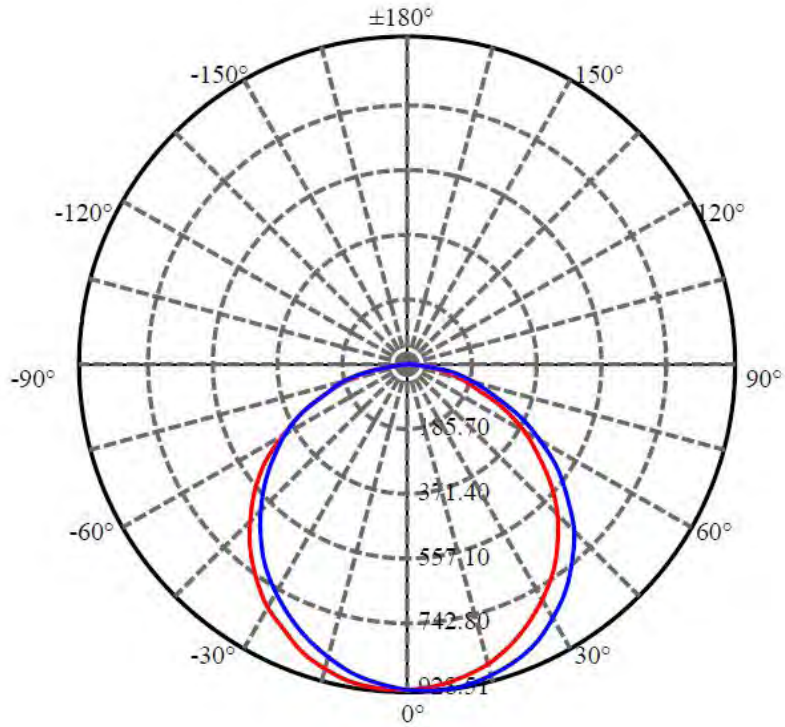
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	919.598	.000	.000	.000%	.000%
5.0	915.300	21.936	21.936	.830%	.830%
10.0	903.768	65.074	87.010	2.462%	3.291%
15.0	884.038	106.052	193.061	4.012%	7.303%
20.0	856.689	143.460	336.521	5.427%	12.730%
25.0	821.875	176.050	512.572	6.660%	19.390%
30.0	780.730	202.811	715.383	7.672%	27.062%
35.0	732.698	222.863	938.246	8.431%	35.493%
40.0	678.952	235.523	1173.769	8.910%	44.403%
45.0	619.531	240.425	1414.193	9.095%	53.498%
50.0	553.455	237.019	1651.213	8.966%	62.464%
55.0	482.863	225.330	1876.543	8.524%	70.988%
60.0	407.650	205.839	2082.382	7.787%	78.775%
65.0	330.107	179.350	2261.732	6.785%	85.559%
70.0	251.521	147.272	2409.004	5.571%	91.130%
75.0	174.700	111.407	2520.411	4.214%	95.345%
80.0	102.202	74.091	2594.502	2.803%	98.148%
85.0	29.164	35.695	2630.198	1.350%	99.498%
90.0	1.223	8.320	2638.518	.315%	99.813%
95.0	.502	.472	2638.990	.018%	99.831%
100.0	.528	.280	2639.270	.011%	99.841%
105.0	.579	.296	2639.566	.011%	99.852%
110.0	.605	.310	2639.875	.012%	99.864%
115.0	.644	.316	2640.192	.012%	99.876%
120.0	.708	.329	2640.520	.012%	99.888%
125.0	.785	.345	2640.865	.013%	99.901%
130.0	.914	.370	2641.235	.014%	99.915%
135.0	.978	.382	2641.617	.014%	99.930%
140.0	.927	.353	2641.970	.013%	99.943%
145.0	1.030	.327	2642.297	.012%	99.956%
150.0	1.004	.300	2642.596	.011%	99.967%
155.0	1.043	.259	2642.855	.010%	99.977%
160.0	1.017	.216	2643.071	.008%	99.985%
165.0	1.094	.174	2643.245	.007%	99.992%
170.0	1.043	.127	2643.372	.005%	99.996%
175.0	1.030	.074	2643.446	.003%	99.999%
180.0	1.081	.025	2643.471	.001%	100.000%



Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]



C0/C180: —

C90/C270: —

Field angle(10%Imax):C0/180Left:80.8 Right:78.9

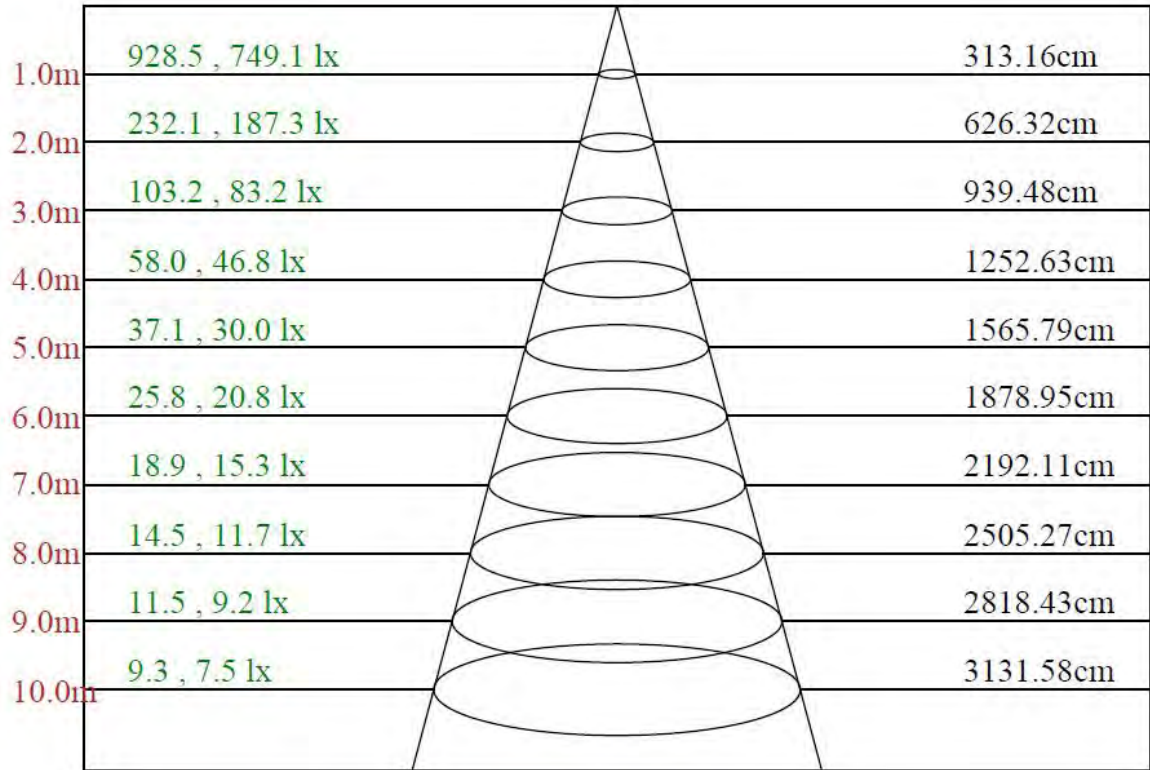
:C90/270Left:86.8 Right:76.1

Beam Angle(50%Imax):C0/180Left:56.7 Right:54.7

:C90/270Left:59.8 Right:53.5



Lux distance Curve



Max , Ave Beam angle of C90plane114.70

**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	923.15	916.15	900.71	879.08	848.20	808.86	766.65	717.02	661.42
22.5	920.68	918.00	907.50	889.79	863.23	828.63	786.01	735.76	683.05
45.0	921.71	923.36	918.00	902.56	879.70	848.20	808.66	760.27	704.05
67.5	921.09	925.83	923.15	911.41	890.41	861.37	824.10	777.56	722.38
90.0	921.92	928.51	926.24	915.33	894.94	866.11	828.84	783.33	728.55
112.5	916.97	922.95	920.06	909.35	889.38	860.34	823.90	777.15	721.76
135.0	917.39	919.65	915.12	900.71	878.88	847.58	808.66	761.09	706.11
157.5	913.88	912.86	904.00	887.11	861.58	826.37	784.15	736.59	682.43
180.0	923.15	921.71	911.00	893.09	866.11	830.90	790.33	741.53	687.37
202.5	920.68	913.68	899.47	877.64	847.58	811.34	768.30	719.29	668.43
225.0	921.71	911.21	893.70	868.79	837.90	799.19	755.32	707.96	654.42
247.5	921.09	907.50	889.79	861.99	829.04	790.74	748.12	699.31	646.80
270.0	921.92	907.50	887.11	859.32	825.54	788.27	744.20	696.22	643.30
292.5	916.97	904.21	883.61	856.84	825.54	786.42	742.56	694.17	643.71
315.0	917.39	905.85	888.76	863.23	831.10	793.42	752.03	703.84	650.51
337.5	913.88	905.85	892.06	868.38	837.90	802.27	759.85	712.08	658.95
360.0	923.15	916.15	900.71	879.08	848.20	808.86	766.65	717.02	661.42
C/γ(°)	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	599.85	529.43	457.15	379.72	300.24	221.57	147.03	77.43	15.65
22.5	622.30	551.26	474.65	397.64	315.89	234.13	156.30	82.58	18.95
45.0	644.33	575.97	500.60	420.91	336.27	251.43	168.24	91.02	22.03
67.5	661.22	589.56	516.66	437.17	355.22	270.79	185.33	105.84	18.33
90.0	665.75	595.32	520.37	439.85	357.07	272.64	189.24	114.49	14.42
112.5	661.22	591.62	515.84	436.14	352.33	270.17	184.92	105.43	11.74
135.0	644.33	575.76	503.07	419.46	333.39	248.14	167.62	90.81	16.06
157.5	621.27	550.84	475.48	395.17	313.21	231.25	153.00	80.52	14.62
180.0	628.06	561.14	487.42	411.23	334.01	254.31	177.30	103.37	38.30
202.5	607.88	542.40	471.36	399.70	323.09	247.31	174.62	103.79	39.33
225.0	596.76	535.19	468.89	397.43	322.27	247.31	176.68	106.87	43.45
247.5	589.56	530.87	464.97	396.81	328.86	256.37	182.86	113.67	45.30
270.0	585.85	525.10	461.27	394.14	327.01	254.31	184.10	121.08	41.60
292.5	587.50	526.34	466.42	397.23	327.62	257.40	188.63	119.44	40.77
315.0	593.26	532.52	469.92	400.73	327.21	254.93	182.04	111.20	43.86
337.5	603.35	541.99	471.77	399.08	328.04	252.26	177.30	107.70	42.21
360.0	599.85	529.43	457.15	379.72	300.24	221.57	147.03	77.43	15.65
C/γ(°)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.21
22.5	0.00	0.21	0.21	0.41	0.41	0.41	0.62	0.41	0.62
45.0	0.41	0.41	0.41	0.41	0.41	0.62	0.62	0.41	0.82
67.5	0.41	0.41	0.41	0.41	0.82	0.41	0.62	0.82	0.82
90.0	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.62	1.03
112.5	0.41	0.41	0.41	0.41	0.41	0.41	0.62	0.62	0.82
135.0	0.41	0.41	0.41	0.41	0.62	0.41	0.62	0.82	0.82
157.5	0.41	0.41	0.41	0.62	0.62	0.41	0.62	0.82	1.03
180.0	2.27	0.41	0.41	0.41	0.41	0.62	0.62	0.82	0.82
202.5	3.30	0.62	0.82	0.41	0.62	0.82	0.82	0.82	1.03
225.0	2.27	0.62	0.82	1.03	0.62	0.82	0.82	0.82	1.24
247.5	1.24	0.82	0.62	1.03	0.82	1.03	0.82	1.03	1.03
270.0	1.03	1.03	0.82	0.82	0.82	1.03	1.03	1.24	1.03
292.5	1.44	0.82	0.82	0.82	0.82	1.03	1.03	1.03	1.24
315.0	2.47	0.62	0.82	0.82	0.82	0.82	1.24	1.03	1.03
337.5	3.09	0.41	0.62	0.82	1.03	1.03	0.82	1.03	1.03
360.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.21



C/ γ (°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	0.21	0.21	0.41	0.21	0.41	0.41	0.41	0.41	0.21
22.5	0.62	0.62	0.82	1.03	0.82	1.24	1.03	1.03	1.03
45.0	1.03	1.03	1.24	0.82	1.03	1.24	1.24	1.03	1.03
67.5	1.03	1.03	0.82	0.82	1.03	1.03	0.82	0.82	1.24
90.0	0.62	0.82	1.03	1.03	1.03	1.03	1.24	1.24	1.24
112.5	0.82	1.03	1.03	1.03	1.03	1.03	1.03	1.24	1.03
135.0	1.03	1.03	1.03	1.03	1.24	1.03	1.03	1.03	1.03
157.5	1.03	0.82	1.03	0.82	1.03	1.03	1.03	1.03	1.24
180.0	1.03	0.82	1.03	0.82	0.82	1.03	1.03	0.82	0.82
202.5	1.03	1.03	1.24	1.24	1.24	0.82	1.24	1.03	1.03
225.0	1.24	1.24	1.44	1.24	1.03	1.03	1.24	1.03	1.03
247.5	1.24	1.03	0.82	1.44	1.03	1.03	1.24	1.03	1.03
270.0	1.24	1.24	1.03	1.24	1.24	1.03	1.24	1.24	1.24
292.5	1.24	0.82	1.03	1.03	1.24	1.03	1.24	1.24	1.24
315.0	1.03	1.03	1.24	1.24	1.24	1.24	1.24	1.24	1.03
337.5	1.24	1.03	1.24	1.03	1.24	1.03	1.24	1.24	1.03
360.0	0.21	0.21	0.41	0.21	0.41	0.41	0.41	0.41	0.21
C/ γ (°)	180.0								
0.0	0.21								
22.5	1.03								
45.0	1.03								
67.5	1.24								
90.0	1.44								
112.5	1.24								
135.0	1.24								
157.5	1.24								
180.0	0.21								
202.5	1.03								
225.0	1.03								
247.5	1.24								
270.0	1.44								
292.5	1.24								
315.0	1.24								
337.5	1.24								
360.0	0.21								



Photo Document



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