



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:

IKIO LED LIGHTING

Address:

8470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250

For Product:

Outdoor Non-Cutoff and Semi-Cutoff Wall-mounted Area Luminaires

Model No.:

IK-WPBO-L110-0026-DN-30-ML /

IK-WPBO-L110-0026-DN-57-ML

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.

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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 used 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	IKIO LED LIGHTING
Manufacturer Address	8470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250
Brand Name	IKIO
Luminaire Type	Outdoor Non-Cutoff and Semi-Cutoff Wall-mounted Area Luminaires
Model Number	IK-WPBO-L110-0026-DN-30-ML/ IK-WPBO-L110-0026-DN-57-ML
Rated Inputs	AC 100-277V 50/60Hz
Rated Power	26 W
Nominal CCT	3000K / 5700K
Date of Receipt Samples	2016-12-07

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
Integral Sphere (2M)	SENSING	SD-20	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
IK-WPBO-L110-0026-DN-30-ML	120.07	60	0.210	25.03	0.992
IK-WPBO-L110-0026-DN-57-ML	120.03	60	0.213	25.40	0.992

3.1.2 Additional Test

Test Item	Model	Test Voltage (V)	Frequency (Hz)	Test Result
Power factor	IK-WPBO-L110-0026-DN-30-ML	120	60	0.992
		277	60	0.933
	IK-WPBO-L110-0026-DN-57-ML	120	60	0.992
		277	60	0.937
Total harmonic distortion	IK-WPBO-L110-0026-DN-30-ML	120	60	10.8%
		277	60	15.4%
	IK-WPBO-L110-0026-DN-57-ML	120	60	11.3%
		277	60	16.2%
Off state power (W)	IK-WPBO-L110-0026-DN-30-ML	120	60	0
	IK-WPBO-L110-0026-DN-30-ML	277	60	0

3.1.3 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-WPBO-L110-0026-DN-30-ML	2509.958	100.278	2988	83.5	15
IK-WPBO-L110-0026-DN-57-ML	2710.129	106.698	5616	84.6	19

3.1.4 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-WPBO-L110-0026-DN-30-ML	0.0001	0.4380	0.4048	0.2509	0.5218
IK-WPBO-L110-0026-DN-57-ML	0.0018	0.3298	0.3423	0.2046	0.4778



3.2 Goniophotometer System

3.2.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
IK-WPBO-L110-0026-DN-30-ML	120.07	60	0.2096	24.767	0.9842

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 80-90°(%lm)
2480.78	100.16	4.40



4 Test Data

IK-WPBO-L110-0026-DN-30-ML

Test Condition

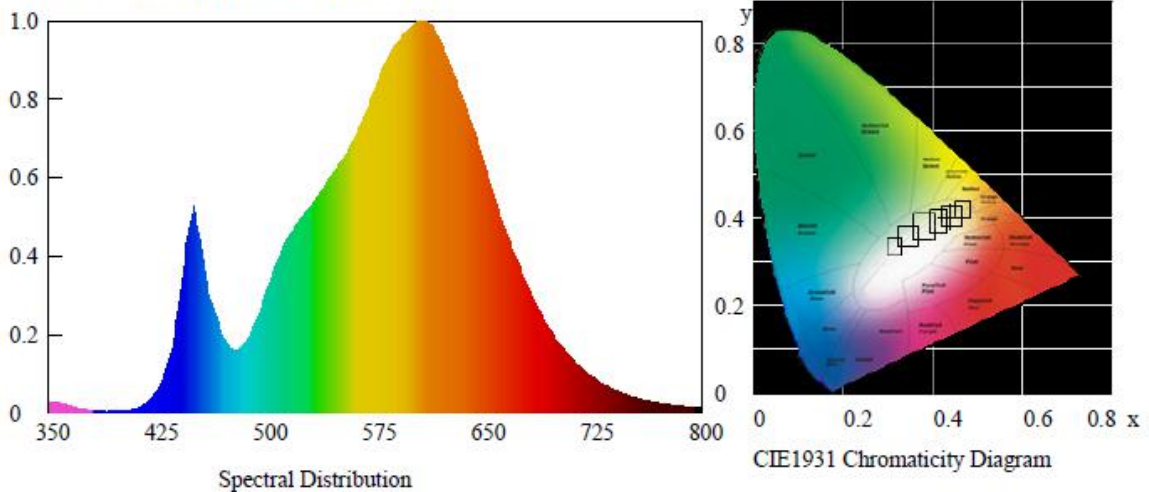
Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: $x=0.4380$ $y=0.4048$ $u'=0.2509$ $v'=0.5218$

Correlated Color Temperature: 2988 K

Dominant Wavelength: 581.0 nm(E)

Luminous Flux: 2509.958 lm

Purity: 0.5327

Chromaticity Difference: 0.0001Duv

Peak Wavelength: 756.2 nm

Color Ratio: $K_r=44.7\%$ $K_g=48.3\%$ $K_b=7.1\%$

Bandwidth: 66.7nm

Radiant Flux: 7.188 W

Rendering Index: $R_a=83.5$

$R_1=82$ $R_2=90$ $R_3=97$ $R_4=82$ $R_5=82$ $R_6=87$ $R_7=85$ $R_8=63$

$R_9=15$ $R_{10}=77$ $R_{11}=82$ $R_{12}=70$ $R_{13}=84$ $R_{14}=98$ $R_{15}=75$

Electric Parameters

Voltage: 120.07 V

Current: 0.21 A

Power Factor: 0.992

Power: 25.03 W

Luminous Efficacy: 100.278 lm/W

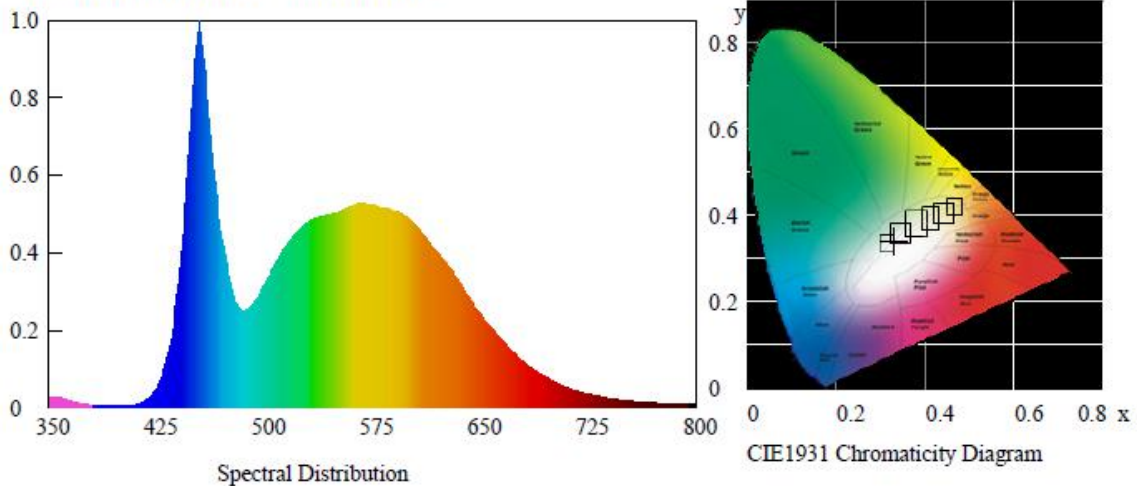
**IK-WPBO-L110-0026-DN-57-ML****Test Condition**

Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

Spectroradiometric ParametersChromaticity Coordinates: $x=0.3298$ $y=0.3423$ $u'=0.2046$ $v'=0.4778$

Correlated Color Temperature: 5616 K

Dominant Wavelength: 529.0 nm(E)

Luminous Flux: 2710.129 lm

Purity: 0.0189

Chromaticity Difference: 0.0018Duv

Peak Wavelength: 448.1 nm

Color Ratio: Kr=32.3% Kg=55.7% Kb=12.0%

Bandwidth: -444nm

Radiant Flux: 7.833 W

Rendering Index: Ra=84.6

R1=84 R2=91 R3=93 R4=82 R5=83 R6=85 R7=88 R8=71

R9=19 R10=76 R11=81 R12=58 R13=86 R14=96 R15=80

Electric Parameters

Voltage: 120.03 V

Current: 0.213 A

Power Factor: 0.992

Power: 25.4 W

Luminous Efficacy: 106.698 lm/W

**Zonal Flux Diagram**

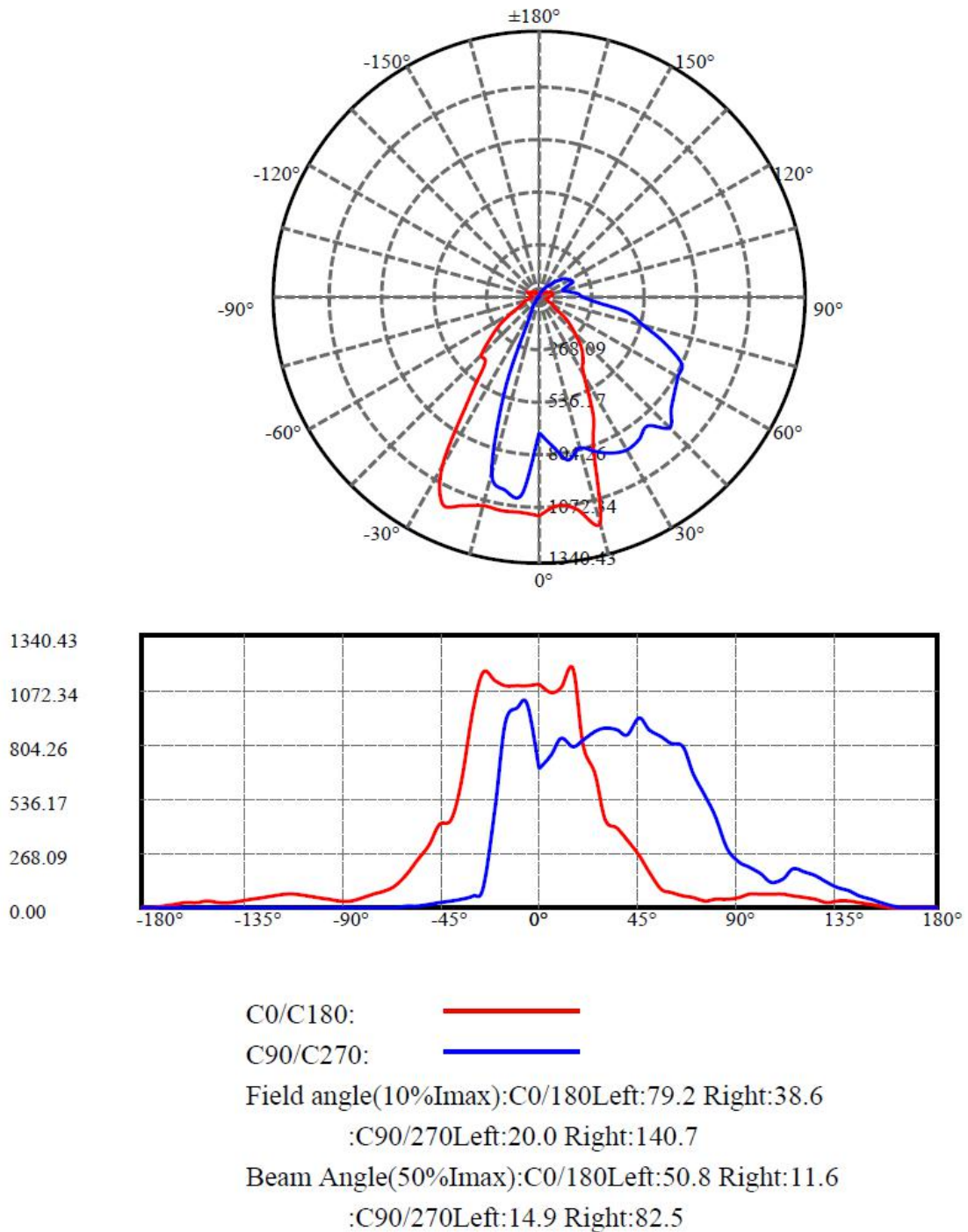
Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	824.747	0.000	0	.000%	.000%
5.0	947.446	21.199	21.199	.855%	.855%
10.0	958.124	68.217	89.416	2.750%	3.604%
15.0	976.908	114.649	204.065	4.622%	8.226%
20.0	933.985	158.080	362.145	6.372%	14.598%
25.0	793.916	183.883	546.028	7.412%	22.010%
30.0	669.818	189.342	735.37	7.632%	29.643%
35.0	534.373	180.831	916.2	7.289%	36.932%
40.0	450.262	165.963	1082.163	6.690%	43.622%
45.0	417.347	162.116	1244.279	6.535%	50.157%
50.0	380.311	163.001	1407.28	6.571%	56.727%
55.0	330.726	156.478	1563.759	6.308%	63.035%
60.0	286.480	144.336	1708.094	5.818%	68.853%
65.0	243.512	129.916	1838.01	5.237%	74.090%
70.0	193.197	111.265	1949.275	4.485%	78.575%
75.0	150.214	90.303	2039.578	3.640%	82.215%
80.0	115.368	71.418	2110.997	2.879%	85.094%
85.0	83.731	54.119	2165.115	2.182%	87.276%
90.0	74.499	43.120	2208.236	1.738%	89.014%
95.0	71.502	39.639	2247.875	1.598%	90.612%
100.0	63.213	36.198	2284.073	1.459%	92.071%
105.0	54.011	31.065	2315.138	1.252%	93.323%
110.0	56.247	28.712	2343.85	1.157%	94.480%
115.0	55.821	28.451	2372.301	1.147%	95.627%
120.0	48.718	25.536	2397.836	1.029%	96.657%
125.0	41.128	20.864	2418.701	.841%	97.498%
130.0	35.272	16.749	2435.45	.675%	98.173%
135.0	31.652	13.601	2449.051	.548%	98.721%
140.0	26.192	10.641	2459.692	.429%	99.150%
145.0	22.693	8.104	2467.796	.327%	99.477%
150.0	17.704	6.021	2473.817	.243%	99.719%
155.0	11.666	3.840	2477.657	.155%	99.874%
160.0	5.278	1.890	2479.547	.076%	99.950%
165.0	2.890	0.755	2480.301	.030%	99.981%
170.0	1.871	0.319	2480.62	.013%	99.994%
175.0	1.445	0.125	2480.745	.005%	99.999%
180.0	1.369	0.034	2480.779	.001%	100.000%



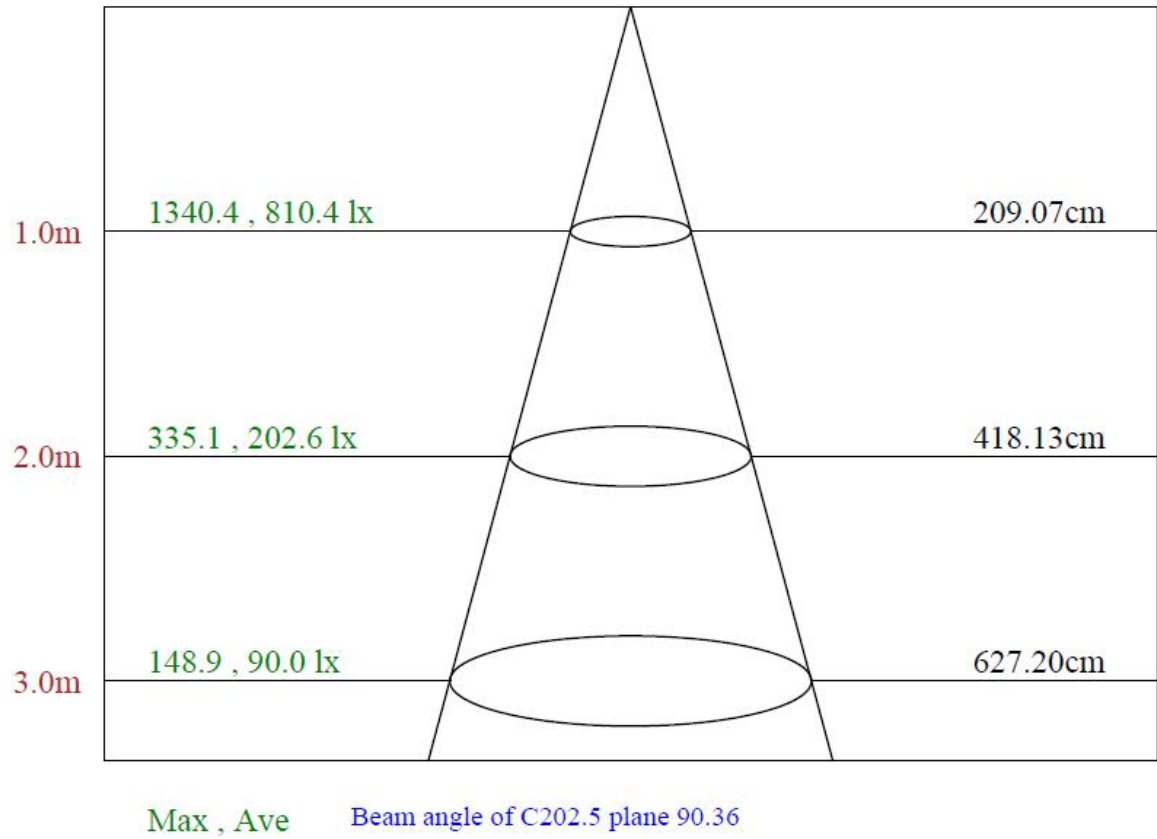
Luminous Intensity Distribution Diagram

Light Distribution Curve [Unit:cd]





Lux distance Curve



**Luminous Intensity Distribution Data**

C/ $\gamma(^{\circ})$	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0
0.0	1097.31	1053.51	1081.01	1171.29	801.87	654.88	437.08	392.78	329.27
22.5	873.91	889.24	1063.97	1163.02	1122.13	883.15	812.58	742.25	658.78
45.0	839.11	858.82	896.05	1029.90	1055.94	1021.14	971.98	902.38	906.52
67.5	753.20	872.45	792.62	820.37	873.18	790.19	884.37	918.20	895.57
90.0	681.17	752.71	831.32	790.19	823.53	868.55	882.67	877.80	848.84
112.5	763.18	801.87	751.98	798.95	865.63	751.25	874.15	867.58	912.11
135.0	779.00	818.66	848.11	991.21	1016.27	986.58	905.30	861.01	854.19
157.5	811.12	847.14	943.26	1017.98	1031.12	872.20	774.13	661.70	586.98
180.0	1097.31	1089.04	1088.79	1090.50	1113.86	1153.77	976.12	615.46	429.53
202.5	873.91	1082.71	970.76	1094.15	1264.74	1340.43	1155.72	619.35	246.04
225.0	839.11	1054.24	1085.39	957.38	1031.85	793.60	364.55	130.93	68.38
247.5	753.20	1042.31	1002.40	941.32	602.07	227.54	102.94	95.40	58.65
270.0	681.17	997.53	984.15	911.63	487.94	96.13	60.11	39.91	29.45
292.5	763.18	1011.40	1004.83	942.29	638.58	288.38	108.54	105.38	68.38
315.0	779.00	993.88	1019.68	884.13	1062.51	866.12	468.23	146.26	72.52
337.5	811.12	993.64	965.65	1026.25	1152.55	1108.75	938.64	573.60	238.98
360.0	1097.31	1053.51	1081.01	1171.29	801.87	654.88	437.08	392.78	329.27
C/ $\gamma(^{\circ})$	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	257.72	174.98	94.18	76.66	56.70	46.00	36.26	40.15	41.62
22.5	549.99	474.55	424.91	297.63	216.59	130.68	120.71	108.30	96.61
45.0	846.41	833.02	766.58	639.31	483.80	378.67	272.08	172.79	137.26
67.5	909.92	935.48	820.61	795.54	742.74	624.22	468.96	361.88	228.03
90.0	933.29	874.39	837.89	806.74	792.87	660.72	550.97	447.30	289.36
112.5	895.32	933.53	833.27	768.53	705.01	616.67	466.28	336.57	226.81
135.0	835.21	752.47	688.95	587.71	483.80	358.96	246.28	172.54	142.12
157.5	518.84	453.38	369.91	291.30	196.39	123.87	117.54	105.86	93.94
180.0	411.77	309.55	235.57	166.46	108.30	81.28	67.17	51.84	32.12
202.5	161.59	100.99	54.27	41.86	33.10	20.69	16.06	11.93	11.20
225.0	46.24	36.02	31.39	19.96	14.36	10.22	7.79	9.25	11.44
247.5	38.21	26.77	19.71	14.85	8.03	3.65	2.92	2.43	2.43
270.0	21.90	14.85	10.46	6.08	3.16	2.19	1.95	1.70	1.46
292.5	41.62	27.01	20.69	13.14	7.79	4.87	3.41	2.43	2.43
315.0	45.51	40.64	31.39	16.79	12.41	9.25	7.54	8.76	10.95
337.5	164.03	97.34	51.84	41.13	31.15	19.23	17.52	12.17	11.93
360.0	257.72	174.98	94.18	76.66	56.70	46.00	36.26	40.15	41.62
C/ $\gamma(^{\circ})$	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	50.86	62.54	69.36	69.60	63.03	55.73	51.84	39.18	26.28
22.5	94.42	93.94	92.48	86.39	72.52	54.03	42.35	32.61	46.24
45.0	121.92	112.68	105.86	75.44	51.35	52.08	58.16	66.19	63.03
67.5	198.58	191.77	138.23	117.30	165.49	163.05	119.49	78.12	50.62
90.0	226.08	200.04	164.51	121.19	144.31	191.28	175.95	157.21	128.74
112.5	193.23	181.30	136.53	106.84	158.91	162.08	135.07	100.26	64.25
135.0	123.87	113.89	106.11	85.66	54.03	44.78	47.21	55.24	59.14
157.5	92.72	97.34	96.13	86.64	68.38	47.21	36.26	29.69	34.31
180.0	36.50	37.48	46.48	56.46	63.03	65.22	58.41	46.00	39.67
202.5	12.17	12.90	14.12	15.09	16.31	17.28	17.28	16.55	17.52
225.0	11.44	9.98	9.73	10.22	9.00	7.79	6.81	5.60	4.38
247.5	2.43	2.19	2.19	2.43	2.43	2.19	1.95	2.43	2.43
270.0	1.46	1.46	1.70	1.95	2.19	2.19	1.70	1.95	1.70
292.5	2.19	2.19	2.43	2.68	2.68	2.43	2.19	2.68	2.68
315.0	11.44	10.71	10.22	9.98	9.00	8.03	6.81	5.60	4.62
337.5	12.66	13.63	15.33	16.31	17.28	17.77	18.01	18.74	18.74
360.0	50.86	62.54	69.36	69.60	63.03	55.73	51.84	39.18	26.28



C/ γ (°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	36.50	35.53	27.50	19.47	11.20	4.14	1.22	1.22	1.22
22.5	47.94	39.18	28.47	18.74	9.98	3.65	1.22	1.22	1.22
45.0	52.57	37.72	24.58	16.79	7.54	2.43	1.22	1.22	1.22
67.5	48.67	51.59	46.48	32.12	21.42	3.65	1.22	1.22	1.46
90.0	102.94	80.31	61.08	40.88	27.74	6.81	1.22	1.22	1.46
112.5	40.88	35.29	35.29	28.96	20.20	3.65	1.46	1.46	1.46
135.0	52.08	40.40	28.23	18.98	8.76	4.14	1.70	1.46	1.46
157.5	42.59	37.23	30.18	22.39	14.36	6.08	2.19	1.46	1.70
180.0	35.53	24.58	28.47	34.07	27.74	21.90	15.09	6.81	1.70
202.5	16.31	7.79	12.66	14.85	10.46	8.52	6.57	3.16	1.46
225.0	4.14	6.33	7.06	7.54	6.08	4.14	2.43	1.46	1.22
247.5	2.43	2.43	2.19	1.95	1.95	1.70	1.70	1.46	1.46
270.0	1.70	1.70	1.70	1.46	1.46	1.46	1.46	1.46	1.46
292.5	2.68	2.43	2.19	1.95	1.70	1.70	1.70	1.46	1.46
315.0	5.35	7.54	8.03	7.54	5.60	3.89	1.95	1.70	1.70
337.5	14.12	9.00	18.98	15.58	10.46	6.57	3.89	1.95	1.46
360.0	36.50	35.53	27.50	19.47	11.20	4.14	1.22	1.22	1.22
C/ γ (°)	180.0								
0.0	1.22								
22.5	1.22								
45.0	1.22								
67.5	1.46								
90.0	1.46								
112.5	1.46								
135.0	1.46								
157.5	1.46								
180.0	1.22								
202.5	1.22								
225.0	1.22								
247.5	1.46								
270.0	1.46								
292.5	1.46								
315.0	1.46								
337.5	1.46								
360.0	1.22								



Photo Document



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