



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:

Architectural Flood and Spot Luminaires

Model No.:

IK-FLBO-L120-0030-DN-30-ML / IK-FLBO-L120-0030-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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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 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	3470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250
Brand Name	IKIO
Luminaire Type	Architectural Flood and Spot Luminaires
Model Number	IK-FLBO-L120-0030-DN-30-ML/ IK-FLBO-L120-0030-DN-57-ML
Rated Inputs	AC 100-277V 50/60Hz
Rated Power	30 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-FLBO-L120-0030-DN-30-ML	120.14	60	0.259	30.82	0.989
IK-FLBO-L120-0030-DN-57-ML	120.09	60	0.260	30.90	0.988

3.1.2 Additional Test

Test Item	Model	Test Voltage (V)	Frequency (Hz)	Test Result
Power factor	IK-FLBO-L120-0030-DN-30-ML	120	60	0.989
		277	60	0.916
	IK-FLBO-L120-0030-DN-57-ML	120	60	0.988
		277	60	0.925
Total harmonic distortion	IK-FLBO-L120-0030-DN-30-ML	120	60	14.3%
		277	60	18.2%
	IK-FLBO-L120-0030-DN-57-ML	120	60	15.1%
		277	60	19.8%
Off state power (W)	IK-FLBO-L120-0030-DN-30-ML	120	60	0
	IK-FLBO-L120-0030-DN-30-ML	277	60	0

3.1.3 Photometric data

Model Number	Luminous Flux (lm)	Efficacy (lm/W)	CCT (K)	CRI	R9
IK-FLBO-L120-0030-DN-30-ML	2922.167	94.814	2979	83.0	12
IK-FLBO-L120-0030-DN-57-ML	3051.900	98.767	5448	83.3	12

3.1.4 Chromaticity Coordinate

Model Number	Duv	x	y	u'	v'
IK-FLBO-L120-0030-DN-30-ML	0.0003	0.4389	0.4056	0.2512	0.5223
IK-FLBO-L120-0030-DN-57-ML	0.0024	0.3337	0.3468	0.2055	0.4806



3.2 Goniophotometer System

3.2.1 Electrical data

Model Number	Input Voltage(V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
IK-FLBO-L120-0030-DN-30-ML	120.08	60	0.2535	30.11	0.9891

3.2.2 Photometric data

Luminous Flux (lm)	Efficacy (lm/W)	Zonal Lumen in 0-90°(%lm)	Zonal Lumen in 80-90°(%lm)
2830.94	94.02	99.827	0.142



4 Test Data

IK-FLBO-L120-0030-DN-30-ML

Test Condition

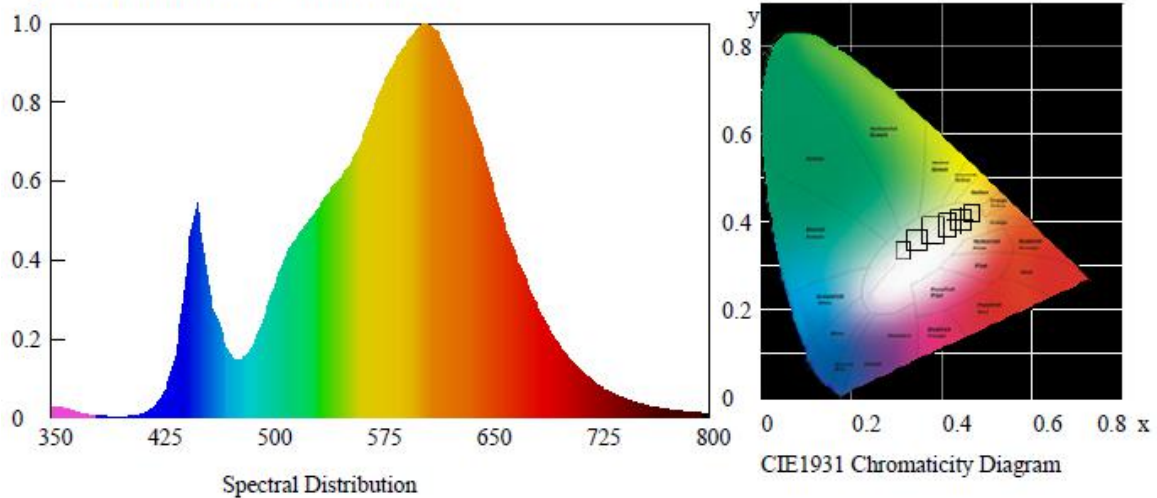
Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

Spectroradiometric Parameters



Chromaticity Coordinates: $x=0.4389$ $y=0.4056$ $u'=0.2512$ $v'=0.5223$

Correlated Color Temperature: 2979 K

Dominant Wavelength: 581.0 nm(E)

Luminous Flux: 2922.167 lm

Purity: 0.5377

Chromaticity Difference: 0.0003Duv

Peak Wavelength: 632.4 nm

Color Ratio: $K_r=44.7\%$ $K_g=48.3\%$ $K_b=7.0\%$

Bandwidth: 141nm

Radiant Flux: 8.126 W

Rendering Index: $R_a=83.0$

$R_1=81$ $R_2=90$ $R_3=97$ $R_4=82$ $R_5=81$ $R_6=87$ $R_7=85$ $R_8=62$

$R_9=12$ $R_{10}=76$ $R_{11}=81$ $R_{12}=69$ $R_{13}=84$ $R_{14}=98$ $R_{15}=75$

Electric Parameters

Voltage: 120.14 V

Current: 0.259 A

Power Factor: 0.989

Power: 30.82 W

Luminous Efficacy: 94.814 lm/W

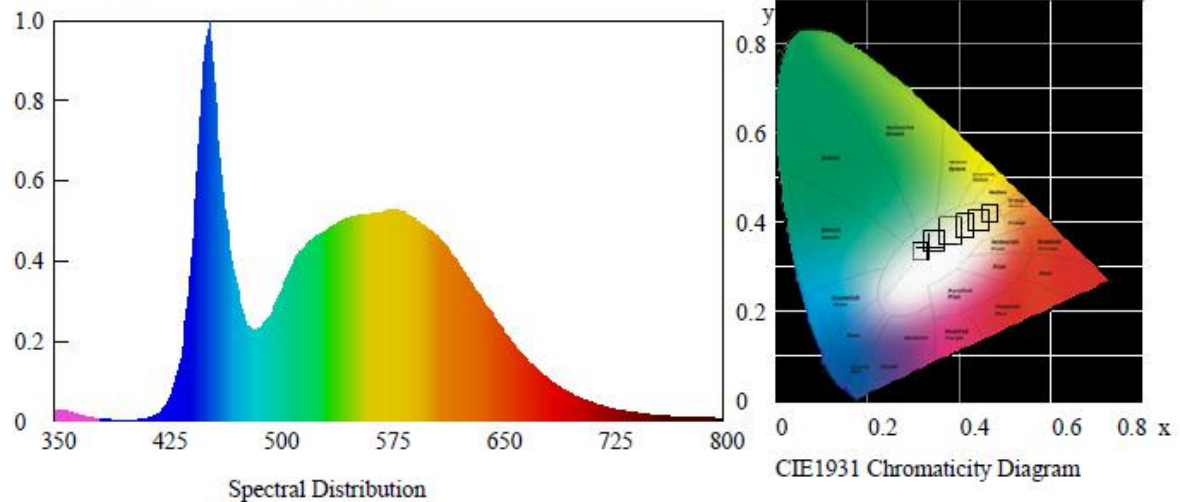
**IK-FLBO-L120-0030-DN-57-ML****Test Condition**

Temperature: 25°C

RH: 58%

Spectrum Range: 350-800 nm

Scan Step: 5 nm

Spectroradiometric ParametersChromaticity Coordinates: $x=0.3337$ $y=0.3468$ $u'=0.2055$ $v'=0.4806$

Correlated Color Temperature: 5448 K

Dominant Wavelength: 554.0 nm(E)

Luminous Flux: 3051.900 lm

Purity: 0.0415

Chromaticity Difference: 0.0024Duv

Peak Wavelength: 448.8 nm

Color Ratio: $K_r=32.6\%$ $K_g=55.8\%$ $K_b=11.6\%$

Bandwidth: -444.7nm

Radiant Flux: 8.234 W

Rendering Index: $R_a=83.3$ $R_1=82$ $R_2=89$ $R_3=92$ $R_4=82$ $R_5=81$ $R_6=83$ $R_7=88$ $R_8=69$ $R_9=12$ $R_{10}=73$ $R_{11}=80$ $R_{12}=56$ $R_{13}=85$ $R_{14}=96$ $R_{15}=78$ **Electric Parameters**

Voltage: 120.09 V

Current: 0.26 A

Power Factor: 0.988

Power: 30.9 W

Luminous Efficacy: 98.767 lm/W

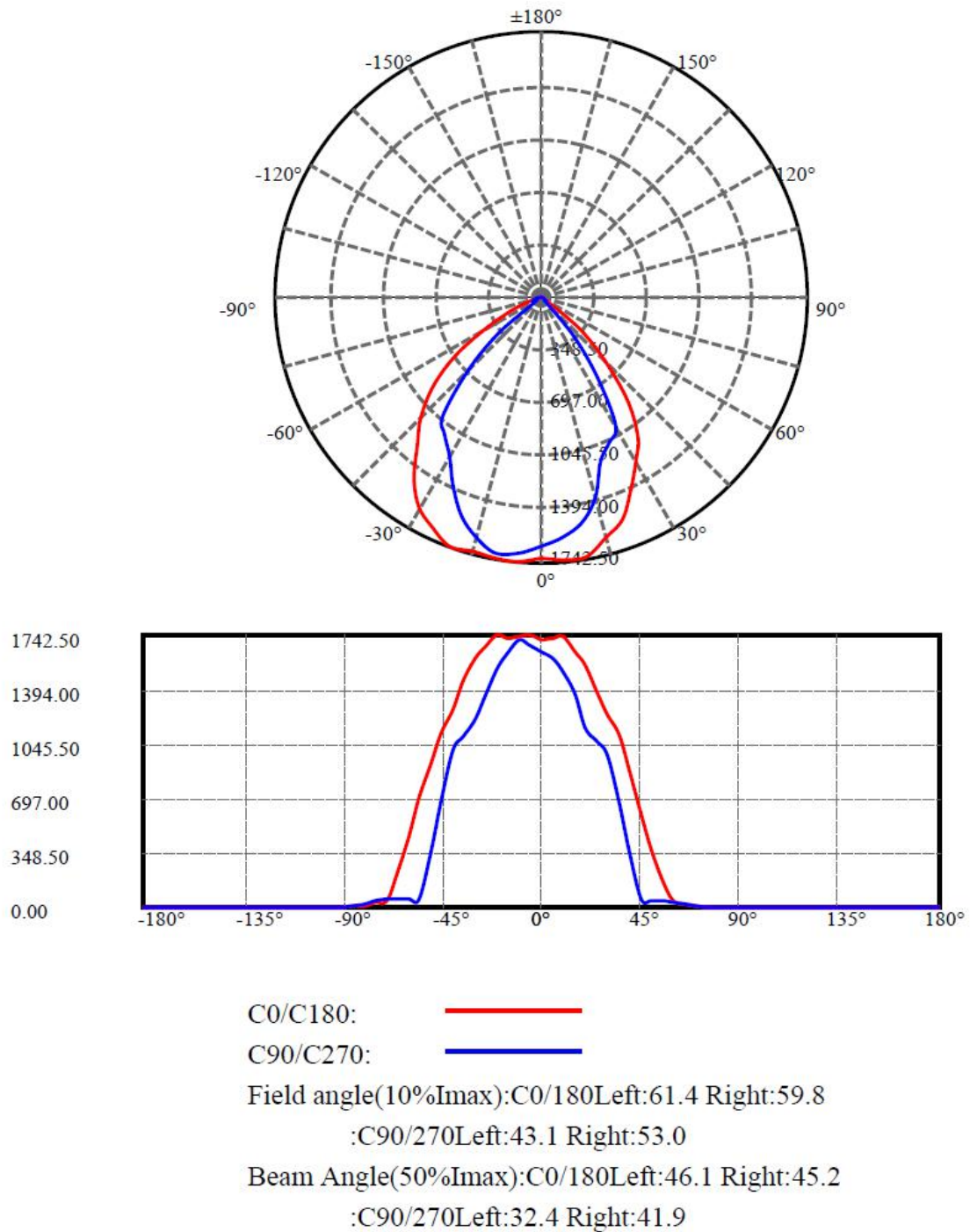
**Zonal Flux Diagram**

Zonal flux distribution table

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	1648.395	0.000	0	.000%	.000%
5.0	1652.023	39.463	39.463	1.394%	1.394%
10.0	1645.948	118.012	157.475	4.169%	5.563%
15.0	1591.529	192.221	349.696	6.790%	12.353%
20.0	1502.417	255.693	605.389	9.032%	21.385%
25.0	1387.930	304.708	910.096	10.763%	32.148%
30.0	1245.238	335.774	1245.871	11.861%	44.009%
35.0	1085.225	346.392	1592.263	12.236%	56.245%
40.0	906.478	336.106	1928.37	11.873%	68.118%
45.0	663.580	295.929	2224.299	10.453%	78.571%
50.0	466.016	235.010	2459.309	8.301%	86.872%
55.0	268.657	167.135	2626.444	5.904%	92.776%
60.0	137.511	100.749	2727.193	3.559%	96.335%
65.0	65.085	53.925	2781.118	1.905%	98.240%
70.0	24.055	24.449	2805.566	.864%	99.104%
75.0	14.378	10.576	2816.142	.374%	99.477%
80.0	6.405	5.881	2822.023	.208%	99.685%
85.0	3.079	2.730	2824.753	.096%	99.781%
90.0	1.430	1.298	2826.051	.046%	99.827%
95.0	0.234	0.472	2826.524	.017%	99.844%
100.0	0.220	0.123	2826.647	.004%	99.848%
105.0	0.220	0.118	2826.765	.004%	99.852%
110.0	0.275	0.128	2826.892	.005%	99.857%
115.0	0.344	0.151	2827.044	.005%	99.862%
120.0	0.495	0.197	2827.241	.007%	99.869%
125.0	0.646	0.256	2827.497	.009%	99.878%
130.0	0.811	0.308	2827.805	.011%	99.889%
135.0	1.004	0.360	2828.165	.013%	99.902%
140.0	1.224	0.407	2828.572	.014%	99.916%
145.0	1.416	0.436	2829.008	.015%	99.932%
150.0	1.595	0.440	2829.448	.016%	99.947%
155.0	1.691	0.415	2829.863	.015%	99.962%
160.0	1.828	0.368	2830.231	.013%	99.975%
165.0	1.855	0.303	2830.534	.011%	99.986%
170.0	1.924	0.224	2830.758	.008%	99.993%
175.0	1.952	0.138	2830.896	.005%	99.998%
180.0	1.979	0.047	2830.943	.002%	100.000%

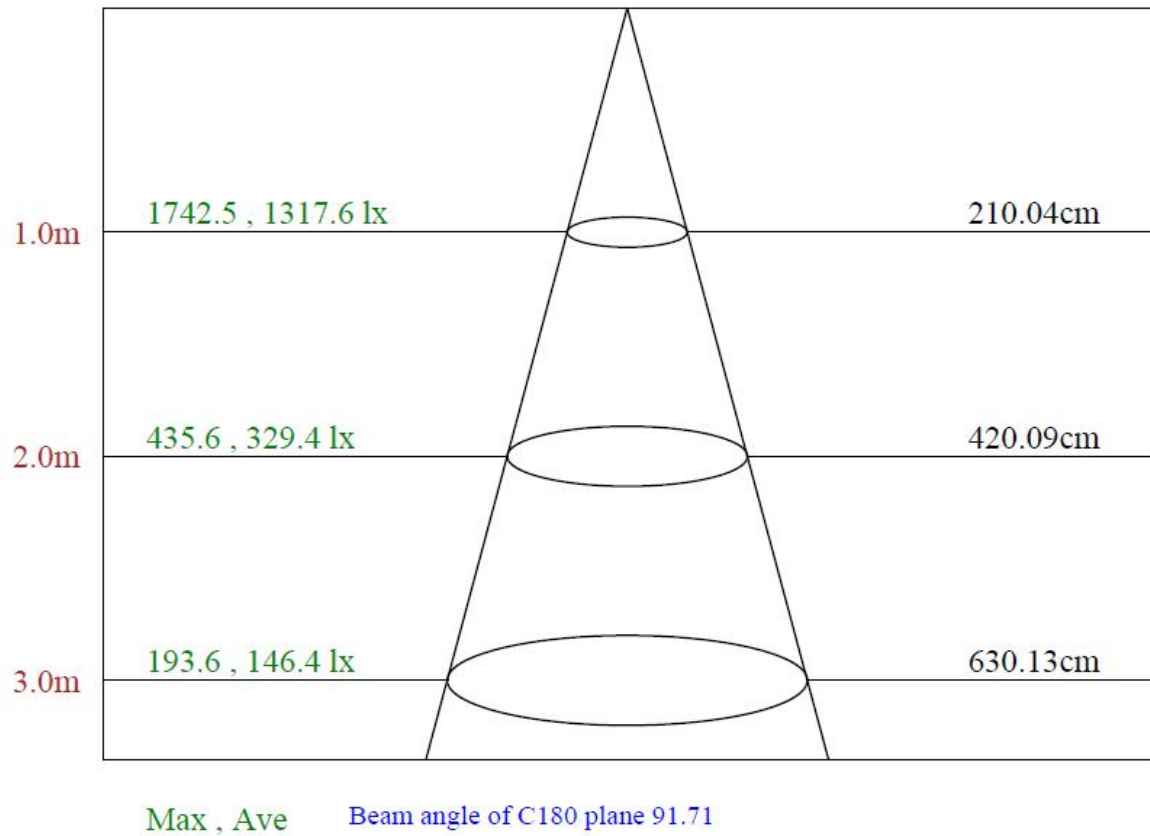
**Luminous Intensity Distribution Diagram**

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	1707.53	1721.38	1728.20	1634.73	1548.52	1379.39	1232.48	1109.32	880.38
22.5	1697.85	1691.47	1634.29	1563.48	1459.45	1334.09	1159.91	1032.57	882.36
45.0	1642.87	1629.67	1588.99	1530.49	1386.87	1198.61	1036.97	917.32	800.10
67.5	1632.09	1539.94	1530.27	1392.81	1210.27	1072.59	983.08	729.72	416.77
90.0	1630.99	1585.91	1503.87	1360.70	1149.57	1057.86	969.67	666.17	353.43
112.5	1644.19	1582.83	1541.70	1404.03	1218.19	1083.15	1000.02	790.42	423.80
135.0	1608.56	1565.89	1538.40	1505.85	1421.18	1245.02	1061.16	924.36	815.06
157.5	1623.08	1586.13	1578.87	1527.85	1440.31	1395.23	1224.56	1065.56	929.64
180.0	1707.53	1742.50	1736.78	1720.94	1737.22	1667.72	1587.67	1452.85	1266.79
202.5	1697.85	1722.92	1717.43	1720.50	1682.68	1674.98	1607.02	1454.61	1269.87
225.0	1642.87	1707.31	1717.21	1686.20	1647.71	1582.83	1412.38	1261.95	1105.14
247.5	1632.09	1694.33	1716.99	1705.11	1588.11	1422.72	1245.02	1119.00	1034.11
270.0	1630.99	1681.36	1704.67	1627.25	1528.51	1353.44	1202.79	1096.35	1008.59
292.5	1644.19	1672.56	1714.57	1702.03	1635.17	1446.47	1258.43	1121.20	1034.77
315.0	1608.56	1656.94	1702.47	1691.91	1668.38	1567.65	1417.88	1222.37	1069.51
337.5	1623.08	1651.23	1680.48	1690.59	1716.55	1725.12	1524.77	1399.85	1213.35
360.0	1707.53	1721.38	1728.20	1634.73	1548.52	1379.39	1232.48	1109.32	880.38
C/ $\gamma(^{\circ})$	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0
0.0	597.99	366.18	166.49	42.45	22.87	9.24	3.52	0.88	0.00
22.5	607.44	404.45	220.15	20.23	11.66	6.16	3.08	0.22	0.22
45.0	438.10	144.93	19.79	15.84	11.88	6.82	2.64	0.22	0.22
67.5	105.13	34.31	31.67	29.47	25.29	10.78	1.98	0.22	0.22
90.0	50.80	47.29	43.99	37.61	23.09	7.26	1.32	0.22	0.22
112.5	172.20	36.51	40.25	38.93	30.57	11.00	3.08	0.22	0.22
135.0	580.61	250.28	22.87	18.91	14.08	7.70	3.52	0.22	0.22
157.5	667.48	428.20	241.48	43.11	18.03	9.46	4.18	1.10	0.22
180.0	1113.72	920.84	699.81	459.43	221.03	48.38	29.25	13.42	5.50
202.5	1080.07	923.26	708.17	482.74	270.07	54.98	15.84	8.80	4.62
225.0	972.97	851.79	515.95	230.27	25.29	21.11	15.62	9.90	5.28
247.5	776.13	475.49	152.19	41.13	42.23	45.09	39.37	18.69	8.36
270.0	680.02	360.46	54.10	53.00	56.08	55.86	42.23	17.15	8.14
292.5	766.67	487.80	178.14	41.13	44.43	46.19	35.19	14.96	7.04
315.0	943.72	827.15	573.36	238.40	24.41	19.57	14.52	8.36	4.84
337.5	1064.24	897.31	630.10	407.53	200.36	25.29	14.74	7.92	3.96
360.0	597.99	366.18	166.49	42.45	22.87	9.24	3.52	0.88	0.00
C/ $\gamma(^{\circ})$	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
0.0	0.00	0.22	0.22	0.22	0.44	0.66	0.88	1.10	1.32
22.5	0.22	0.22	0.22	0.22	0.44	0.66	0.66	0.88	1.10
45.0	0.22	0.22	0.22	0.22	0.22	0.44	0.66	0.66	0.88
67.5	0.22	0.22	0.22	0.22	0.22	0.22	0.44	0.66	0.88
90.0	0.22	0.22	0.22	0.22	0.22	0.22	0.44	0.66	0.88
112.5	0.22	0.22	0.22	0.22	0.22	0.44	0.66	0.88	1.10
135.0	0.22	0.22	0.22	0.22	0.44	0.44	0.66	0.88	1.10
157.5	0.22	0.22	0.22	0.22	0.44	0.66	0.88	1.10	1.10
180.0	1.98	0.22	0.22	0.22	0.22	0.22	0.44	0.44	0.66
202.5	2.42	0.22	0.22	0.22	0.22	0.22	0.44	0.66	0.66
225.0	3.08	0.44	0.22	0.22	0.22	0.22	0.22	0.44	0.66
247.5	3.52	0.22	0.22	0.22	0.22	0.22	0.22	0.44	0.44
270.0	3.30	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.44
292.5	3.08	0.22	0.22	0.22	0.22	0.22	0.22	0.44	0.44
315.0	2.20	0.22	0.22	0.22	0.22	0.22	0.44	0.44	0.66
337.5	1.76	0.22	0.22	0.22	0.22	0.22	0.44	0.44	0.66
360.0	0.00	0.22	0.22	0.22	0.44	0.66	0.88	1.10	1.32



C/ γ (°)	135.0	140.0	145.0	150.0	155.0	160.0	165.0	170.0	175.0
0.0	1.32	1.54	1.76	1.76	1.76	1.98	1.76	1.98	1.98
22.5	1.32	1.54	1.54	1.76	1.76	1.76	1.98	1.98	1.98
45.0	1.10	1.32	1.54	1.76	1.76	1.98	1.98	1.98	1.98
67.5	1.10	1.32	1.54	1.76	1.76	1.98	1.98	1.98	1.98
90.0	1.10	1.32	1.54	1.76	1.76	1.98	1.98	1.98	1.98
112.5	1.32	1.54	1.54	1.76	1.76	1.98	1.98	1.98	1.98
135.0	1.32	1.54	1.76	1.76	1.76	1.76	1.98	1.98	1.98
157.5	1.32	1.54	1.76	1.76	1.76	1.76	1.76	1.98	1.98
180.0	0.88	1.10	1.32	1.54	1.76	1.76	1.76	1.76	1.76
202.5	0.88	1.10	1.32	1.54	1.76	1.76	1.76	1.98	1.98
225.0	0.88	1.10	1.32	1.54	1.76	1.76	1.98	1.98	1.98
247.5	0.66	0.88	1.10	1.32	1.54	1.76	1.76	1.98	1.98
270.0	0.66	0.88	1.10	1.32	1.54	1.76	1.76	1.98	1.98
292.5	0.66	0.88	1.10	1.32	1.54	1.76	1.76	1.76	1.98
315.0	0.66	0.88	1.10	1.32	1.54	1.76	1.76	1.76	1.98
337.5	0.88	1.10	1.32	1.54	1.54	1.76	1.76	1.76	1.76
360.0	1.32	1.54	1.76	1.76	1.76	1.98	1.76	1.98	1.98
C/ γ (°)	180.0								
0.0	1.98								
22.5	1.98								
45.0	1.98								
67.5	1.98								
90.0	1.98								
112.5	1.98								
135.0	1.98								
157.5	1.98								
180.0	1.98								
202.5	1.98								
225.0	1.98								
247.5	1.98								
270.0	1.98								
292.5	1.98								
315.0	1.98								
337.5	1.98								
360.0	1.98								



Photo Document



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