

LM-79-08 Test Report

For

Builders Pack

(Brand Name: Builders Pack)

No.701, BuildingA, Shenfubao Industry Park, Futina District, Shenzhen PRC
518017

2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces

Model name(s): 44-6060-20W-XXK-TR2-D-[N;S]-B

Remark: The first X may be D or N, "D"=Dimming "N"=Not Dimming; the second X may be N or P, "N"=Not Sensor "P"=Sensor; "ZZ" represented for CCT, it can be 35=3500K,40=4000K, 45=4500K,50=5000K

Representative (Tested) Model: 44-6060-20W-35K-TR2-D-[N;S]-B
44-6060-20W-50K-TR2-D-[N;S]-B

Model Different: All construction and rating are the same, except CCT

Test & Report By:

Bill Luo

Engineer: Bill Luo

Date: Dec.18,2017

Review By:

Univ Xie

Manager: Univ Xie

Note: 1.The results contained in this report pertain only to the tested samples.

2.This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Laboratory: Standard-Tech Co. Ltd Testing Center
NVLAP CODE: 201011-0

Report Format Number STD/QR4909-A/2


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<http://www.standard-tech.com>

1.1 Product Information:

Organization Name	Builders Pack	
Brand Name	Builders Pack	
Model Number	44-6060-20W-XXK-TR2-D-[N;S]-B	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces	
Rated Voltage / Frequency	120-277Vac, 60Hz	
Nominal Power	20W	
Rated Initial Lamp Lumen	--	
Declared CCT	3500K,4000K,4500K,5000K	
LED Manufacturer	EVERLIGHT ELECTRONICS CO., LTD	
LED Model	67-21S Series (3000K)	
Sample Number	GZE1709086-E1(3500K), E2(5000K)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s
Photo		
		

1.2 Test Specifications:

Date of Receipt	Nov.20,2017
Date of Test	Nov.21,2017
Test item	<ol style="list-style-type: none"> 1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate 7. Electrical Parameters
Reference Standard	<ol style="list-style-type: none"> 1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products 2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products 3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources 4. CIE 15-2004 Technical Report Colorimetry 5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source 6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems
Reference Work Instruction	QD25

1.3 Test Methods

1) Photometric and Light Distribution Measurement – Goniophotometer Method: Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals.
2) Chromaticity Measurement – Sphere-Spectroradiometer Method: Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral power distribution taken at 5 nm intervals over the range of 380 to 780 nm.
3) Electrical Measurements: Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Voltage, frequency, current, power, power factor and total harmonic distortion were measured by and read from the power meter.

2.1 Electrical, Photometric and Chromaticity Measurements
(Refer to Work Instruction QD25)

Test date	2017-11-21	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	44-6060-20W-35K-TR2-D-[N;S]-B		

Electrical Measurement:

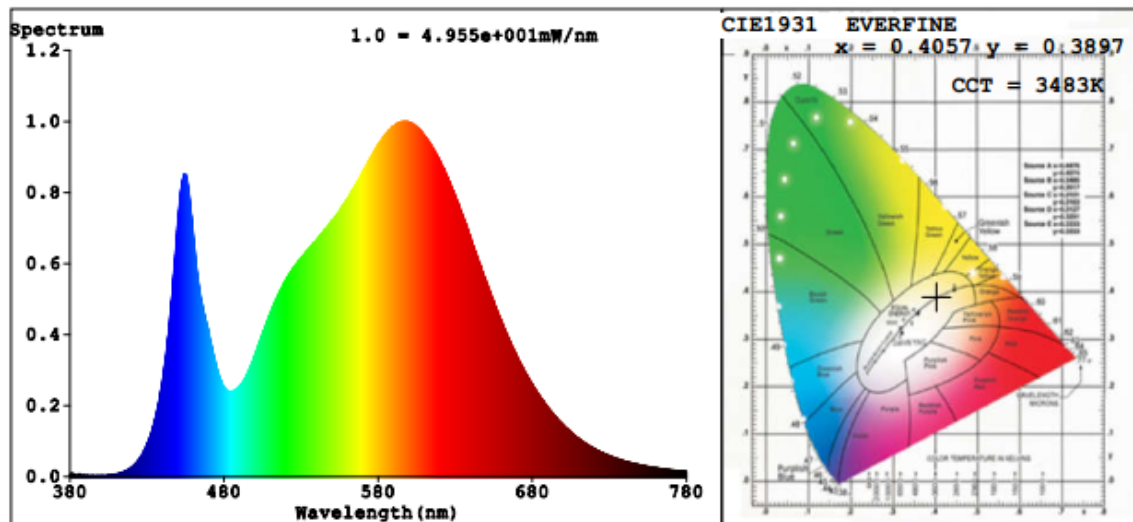
Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170908	120.0	60	0.1721	20.11	0.9739	6.19
6-E1	277.0	60	0.0830	20.65	0.8982	13.22
DLC Pass Criteria					$\geq 0.9(-3\%)$	$\leq 20(+5)$

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	8
Frequency (Hz)	60	R2	90	R10	76
CCT (K)	3483	R3	96	R11	77
Duv	-0.0005	R4	79	R12	62
Chromaticity (x, y)	x=0.4057 y=0.3897	R5	80	R13	83
Chromaticity (u', v')	u'=0.2364 v'=0.5109	R6	86	R14	98
Color Rendering Index (CRI)	82.2	R7	84	R15	75
R9	8	R8	62	--	--

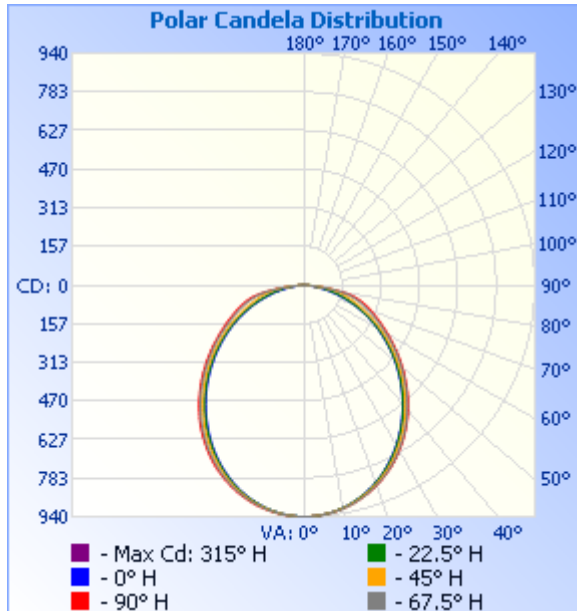
Photometric Measurement – Goniophotometer Method:

Parameter	Result		DLC V4.2 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	2523.5	2586.1	$\geq 2000(-10\%)$	
Luminous Efficacy (lm/W)	125.48	125.23	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$
Most Worst Luminous/Highest Watts	122.20			
Zonal lumens in the 0-60° zone (%)	78.6	--	$\geq 75(-3)$	
SC: 0-180° (if applicable)	1.23	--	1.0-2.0(± 0.1)	
SC: 90-270° (if applicable)	1.19	--	1.0-2.0(± 0.1)	
Beam Angle (°)	105.1	--	--	
Center Beam Candle Power (cd)	939	--	--	

Spectral Power Distribution & Chromaticity Diagram

Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	714.9	28.3%
0-40	1,154.9	45.8%
0-60	1,984.2	78.6%
60-90	539.0	21.4%
70-100	242.1	9.6%
90-120	0.1	0%
0-90	2,523.1	100%
90-180	0.1	0%
0-180	2,523.2	100%

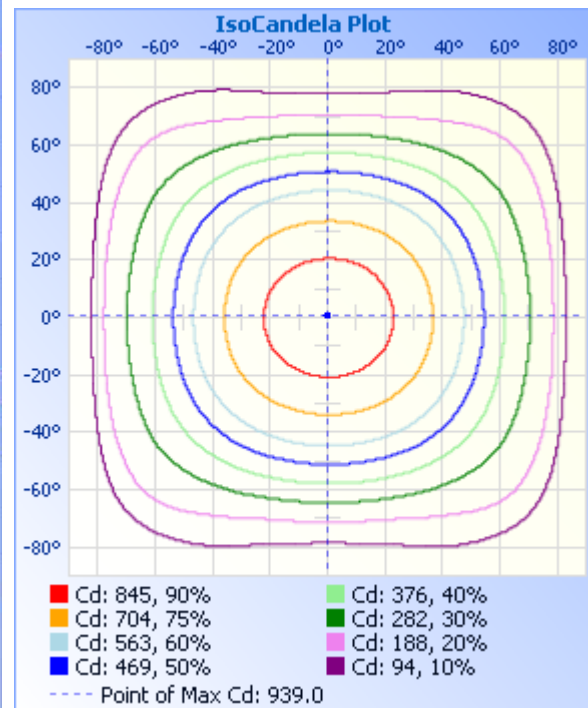
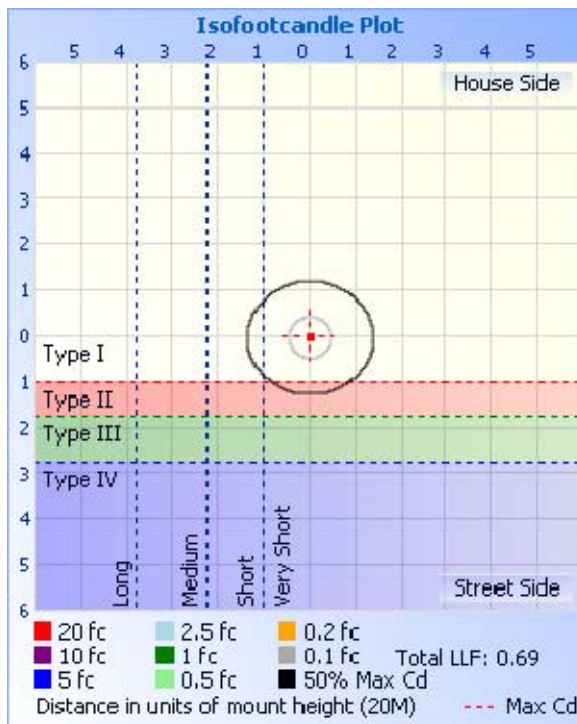
Lumens Per Zone					
Zone	Lumens	%Total	Zone	Lumens	%Total
0-10	88.6	3.5%	90-100	0.1	0%
10-20	251.6	10.0%	100-110	0	0%
20-30	374.6	14.8%	110-120	0	0%
30-40	440.0	17.4%	120-130	0	0%
40-50	441.8	17.5%	130-140	0	0%
50-60	387.5	15.4%	140-150	0	0%
60-70	296.9	11.8%	150-160	0	0%
70-80	191.6	7.6%	160-170	0	0%
80-90	50.5	2.0%	170-180	0	0%

Photometric Data


Illuminance at a Distance

	Center Beam fc	Beam Width	
3.33M	7.85 fc	8.23 M	9.22 M
6.67M	1.96 fc	16.45 M	18.43 M
10.00M	0.87 fc	24.68 M	27.65 M
13.33M	0.49 fc	32.90 M	36.87 M
16.67M	0.31 fc	41.13 M	46.09 M
20.00M	0.22 fc	49.36 M	55.31 M

■ Vert. Spread: 102.0°
 ■ Horiz. Spread: 108.2°



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Table--1

UNIT: cd

C (DEG) γ (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338	
0	939	939	939	939	939	939	939	939	939	939	939	939	939	939	939	939	
5	934	934	934	934	934	934	934	934	934	934	933	933	933	932	933	934	
10	921	920	920	918	917	918	919	921	920	919	917	915	915	915	917	919	
15	898	896	895	892	890	891	893	897	897	896	890	887	886	888	891	895	
20	867	864	860	855	852	854	859	865	865	862	855	849	847	850	856	862	
25	826	822	817	809	806	808	815	823	825	821	811	802	800	803	812	820	
30	778	773	766	756	751	754	764	774	776	771	758	748	745	749	760	771	
35	723	717	707	696	691	694	705	718	721	714	700	688	684	689	702	714	
40	660	655	643	631	626	629	642	655	659	652	636	623	619	624	638	652	
45	594	587	576	563	557	561	574	589	593	585	569	555	551	556	570	587	
50	526	518	505	492	487	490	504	520	525	516	499	485	480	486	500	517	
55	458	449	434	421	415	419	434	451	458	448	429	413	408	414	430	448	
60	394	383	365	349	344	347	364	385	394	383	360	342	337	344	361	383	
65	336	322	298	279	272	277	297	323	337	322	294	272	267	273	294	322	
70	285	269	236	211	202	209	236	270	286	270	233	205	197	206	233	270	
75	236	219	183	147	135	146	182	219	235	219	181	142	130	143	181	220	
80	155	150	129	90.8	73.7	89.5	130	150	154	148	126	87.0	70.4	87.2	128	151	
85	43.9	44.9	45.7	37.4	25.9	38.5	47.4	45.5	43.5	42.2	41.9	34.7	24.2	35.5	44.0	44.2	
90	1.31	1.38	1.11	0.91	0.74	0.85	1.04	1.12	0.92	0.78	0.59	0.48	4.64	0.67	1.41	0.98	
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2017-11-21	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	44-6060-20W-50K-TR2-D-[N;S]-B		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170908	120.0	60	0.1702	19.98	0.9782	6.63
6-E2	277.0	60	0.0818	20.31	0.8967	13.85
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

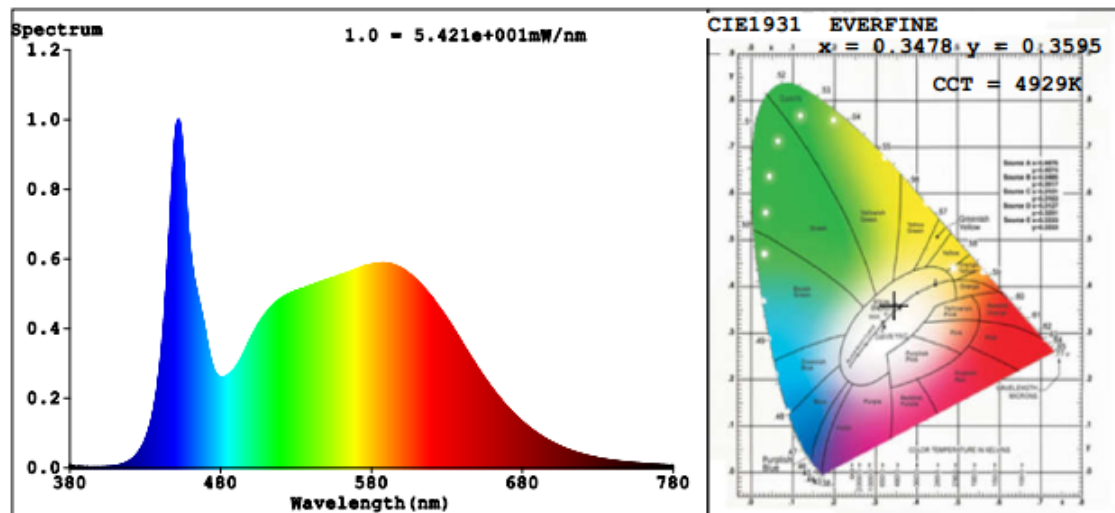
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	16
Frequency (Hz)	60	R2	91	R10	77
CCT (K)	4929	R3	95	R11	82
Duv	0.0029	R4	83	R12	58
Chromaticity (x, y)	x=0.3478 y=0.3595	R5	83	R13	86
Chromaticity (u', v')	u'=0.2102 v'=0.4889	R6	86	R14	98
Color Rendering Index (CRI)	84.9	R7	88	R15	78
R9	16	R8	70	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.2 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	2550	2597	>=2000(-10%)	
Luminous Efficacy (lm/W)	127.63	127.87	Standard: >=	Premium: >=
Most Worst Luminous/Highest Watts	125.55		100(-3%)	125(-3%)

Spectral Power Distribution & Chromaticity Diagram



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2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
44-6060-20W-35K-TR2-D-[N;S]-B	3500K	2523.5	20.11	125.48
44-6060-20W-40K-TR2-D-[N;S]-B	4000K	2532 ^{*1}	20.05 ^{*2}	126.28 ^{*3}
44-6060-20W-45K-TR2-D-[N;S]-B	4500K	2541 ^{*1}	20.05 ^{*2}	126.73 ^{*3}
44-6060-20W-50K-TR2-D-[N;S]-B	5000K	2550	19.98	127.63

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

$$2532 = (2550 - 2523.5) / 3 + 2523.5$$

$$2541 = (2550 - 2523.5) / 3 + 2532$$

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

$$20.05 = (20.11 + 19.98) / 2$$

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

$$126.28 = 2532 / 20.05$$

$$126.73 = 2541 / 20.05$$

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3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-331	2 meter Integrating Sphere	2017-07-01	2018-06-30
ST-R-327	Spectral analysis system HAAS-2000	2017-07-01	2018-06-30
D204	Standard Lamp	2017-07-12	2018-07-11
PF2010	Power Meter for Integrating Sphere	2017-07-01	2018-06-30
GO-R5000	Goniophotometer system	2017-07-01	2018-06-30
D908S	Standard Lamp	2017-07-12	2018-07-11
PF210	Power Meter for Goniophotometer	2017-07-07	2018-07-06
Expand Uncertainty: Photometric Measurement (Sphere):2.04%, k=2 Chromaticity Measurement(Sphere):28.8K, k=2 Photometric Measurement(Goniophotometer):2.36%, k=2			

******* END OF REPORT *******