LM-79-08 Test Report

For

AOK LED Light Company Limited

(Brand Name:)

Building 1, St George's Science and Technology Industrial Park, Shajin Street, Shenzhen, Guangdong Province, China Zip 518104

Outdoor Pole/Arm-Mounted Area and Roadway Luminaires

Model name(s): AOK-150WIS-(D)-X

Representative (Tested) Model: AOK-150WIS-(D)-X(3000K)
AOK-150WIS-(D)-X(5700K)

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

Test & Report By:

Garman Mo

Engineer: Garman Mo

Date: Jun.15,2017

Review By:

Tommy Liang

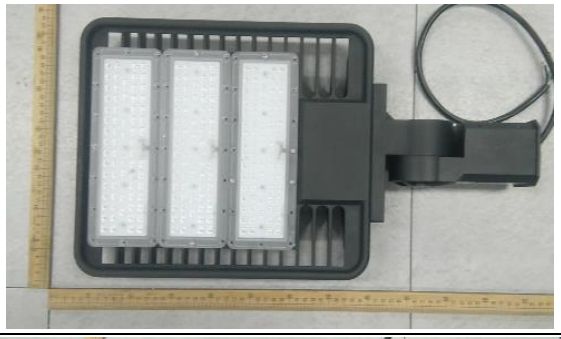
Manager: Tommy Liang

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

1.1 Product Information:

Organization Name	AOK LED Light Company Limited	
Brand Name		
Model Number	AOK-150WIS-(D)-X	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Outdoor Pole/Arm-Mounted Area and Roadway Luminaires	
Rated Voltage / Frequency	90 -305Vac, 47-63 Hz	
Nominal Power	150W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K,4500K,5000K,5700K	
LED Manufacturer	Philips Lumileds	
LED Model	LUXEON 3030 2D	
Sample Number	GZE170259-O1(3000K),O2(5700K)	
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	Jun.09,2017
Date of Test	Jun.10,2017
Test item	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	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 °C ±1 °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 ºC ±1 ºC. 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 ºC ±1 ºC. 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	2017-06-10	Test Ambient:	25.2 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	AOK-150WIS-(D)-X(3000K)		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170259-O1	120.0	60	1.256	149.7	0.9933	8.51
	277.0	60	0.5757	147.2	0.9231	13.07
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method:

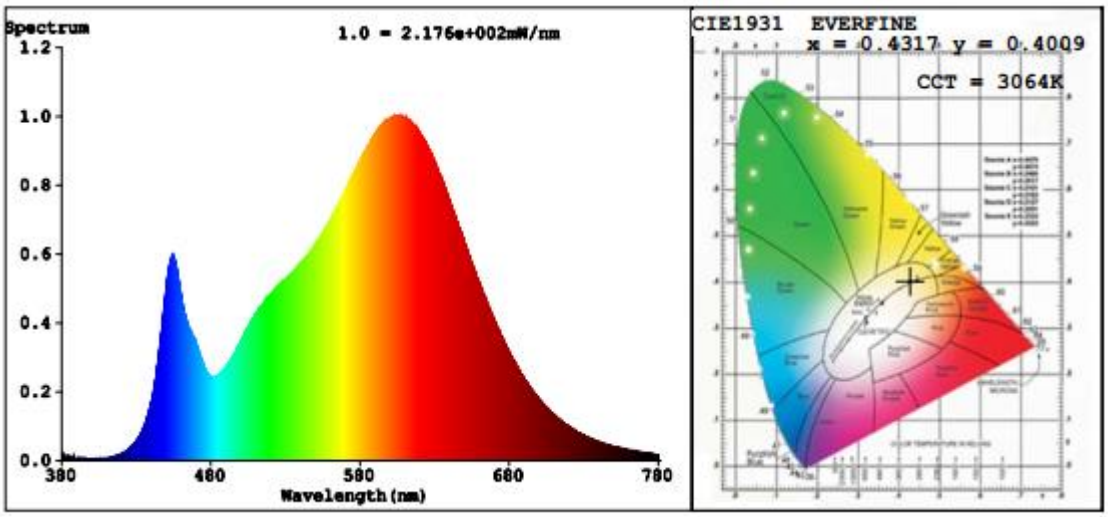
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	3064
Duv	-0.0005
Chromaticity (x, y)	x=0.4317 y=0.4009
Chromaticity (u', v')	u'=0.2486 v'=0.5193
Color Rendering Index (CRI)	85.2
R9	20

Special Color Rendering Indices			
R1	85	R9	20
R2	94	R10	85
R3	96	R11	82
R4	83	R12	73
R5	85	R13	87
R6	92	R14	99
R7	84	R15	78
R8	64	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result		DLC V4.1 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	19231	19050	>=1000(-10%)	
Luminous Efficacy (lm/W)	128.46	129.42	Standard: >= 100(-3%)	Premium: >= 120(-3%)
Most worst Luminous/Highest Watts	127.25			
Zonal lumens in the 0-90 °zone (%)	99.8	--	>=100(-1)	
Zonal lumens in the 80-90 °zone (%)	1.0	--	<=10(+3)	
Beam Angle ( )	88.2	--	--	
Center Beam Candle Power (cd)	4580	--	--	

Spectral Power Distribution & Chromaticity Diagram

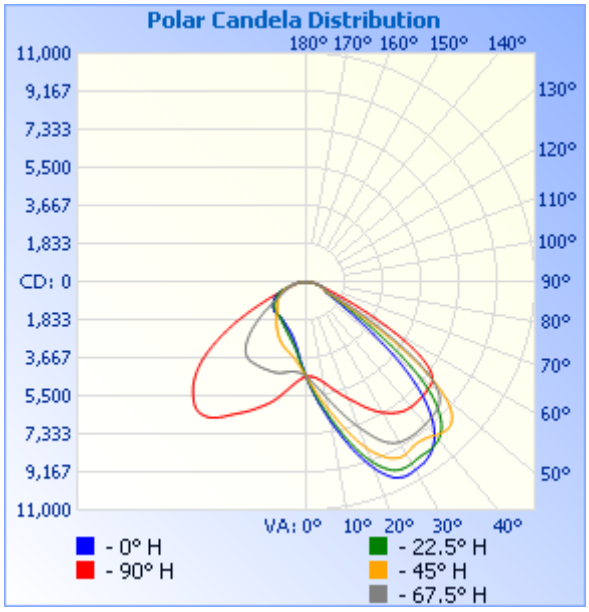


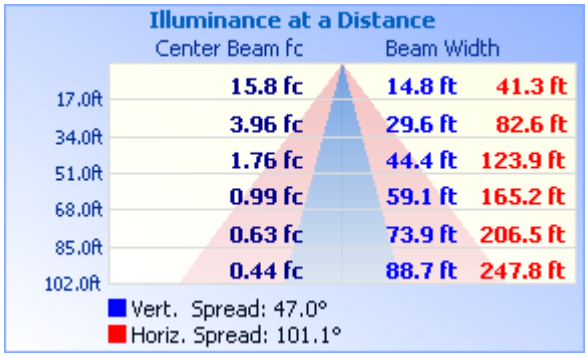
Zonal Lumen Tabulation

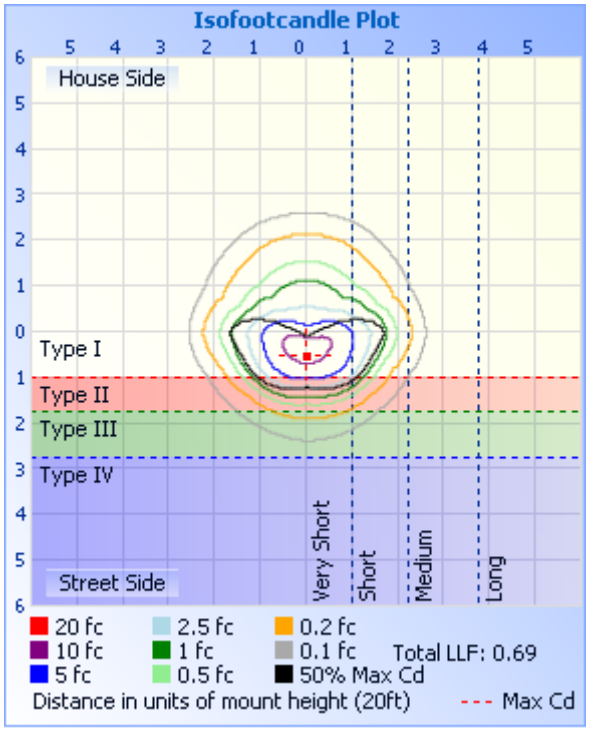
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	4,981.5	25.9%
0-40	9,052.6	47.1%
0-60	16,890.0	87.8%
60-90	2,302.5	12%
70-100	908.1	4.7%
90-120	6.2	0%
0-90	19,192.5	99.8%
90-180	38.6	0.2%
0-180	19,231.1	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	457.6	2.4%	90-100	0.6	0%
10-20	1,580.4	8.2%	100-110	1.6	0%
20-30	2,943.4	15.3%	110-120	4.0	0%
30-40	4,071.1	21.2%	120-130	6.9	0%
40-50	4,583.9	23.8%	130-140	8.6	0%
50-60	3,253.6	16.9%	140-150	7.5	0%
60-70	1,395.0	7.3%	150-160	5.2	0%
70-80	724.1	3.8%	160-170	3.0	0%
80-90	183.4	1.0%	170-180	1.2	0%

Photometric Data







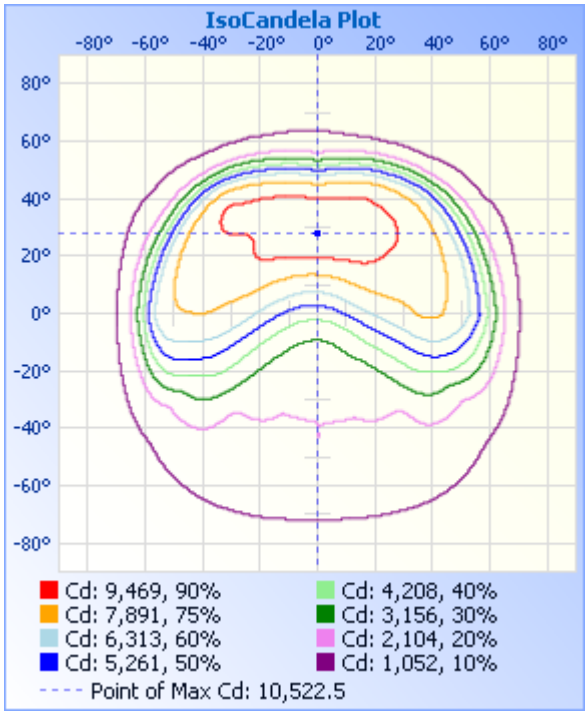


Table--1 UNIT: ×10cd

γ (DEG) \ C (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338	
0	458	458	458	458	458	458	458	458	458	458	458	458	458	458	458	458	
5	482	519	547	563	565	555	533	501	462	424	391	371	365	376	401	438	
10	530	606	659	684	686	666	627	567	494	415	350	311	301	318	366	440	
15	591	704	782	818	824	796	739	653	544	423	327	277	266	285	345	454	
20	642	788	890	940	956	922	853	747	601	437	312	255	245	262	326	463	
25	692	855	950	1013	1041	1003	936	842	665	449	296	239	230	243	302	465	
30	744	898	961	1011	1047	1013	959	893	727	464	277	225	220	226	276	467	
35	799	921	955	997	1028	1005	943	901	769	475	255	213	212	214	249	467	
40	812	905	948	979	960	991	965	894	787	464	227	205	210	208	221	450	
45	769	835	908	914	809	910	980	883	785	423	200	200	210	205	198	401	
50	692	712	766	713	539	709	880	833	780	360	179	194	204	198	181	322	
55	564	519	487	384	256	376	560	615	719	274	164	183	194	186	167	231	
60	388	255	185	156	129	164	202	276	493	188	149	168	178	169	151	159	
65	209	113	96.5	96.2	102	101	100	123	232	128	130	151	158	151	131	120	
70	107	87.0	79.7	81.1	86.3	86.0	82.5	90.0	110	96.7	108	122	119	119	108	95.9	
75	63.7	64.9	59.7	59.0	51.9	61.5	61.4	68.0	67.5	72.0	77.0	78.5	79.0	75.5	75.1	70.8	
80	41.4	43.0	32.1	33.3	25.5	34.5	34.6	47.0	43.1	46.3	44.3	47.8	54.6	46.3	43.8	42.8	
85	17.0	13.8	10.8	9.62	6.80	9.97	11.6	16.1	18.7	16.0	18.0	21.0	28.8	20.6	17.4	14.7	
90	0.12	0.12	0.09	0.09	0.07	0.08	0.10	0.11	0.09	0.05	0.04	0.06	0.06	0.04	0.04	0.05	
95	0.07	0.07	0.07	0.06	0.04	0.05	0.06	0.06	0.05	0.04	0.01	0.03	0.02	0.02	0.02	0.04	
100	0.15	0.08	0.09	0.07	0.06	0.06	0.06	0.07	0.09	0.04	0.03	0.03	0.03	0.03	0.04	0.06	
105	0.42	0.15	0.11	0.16	0.14	0.11	0.10	0.13	0.24	0.12	0.07	0.06	0.06	0.07	0.11	0.20	
110	0.76	0.27	0.16	0.19	0.21	0.17	0.16	0.22	0.42	0.29	0.18	0.18	0.15	0.20	0.34	0.44	
115	0.99	0.44	0.23	0.23	0.26	0.19	0.21	0.35	0.58	0.55	0.45	0.23	0.28	0.23	0.59	0.67	
120	1.16	0.60	0.29	0.29	0.30	0.26	0.24	0.47	0.74	0.78	0.76	0.61	0.44	0.63	0.86	0.88	
125	1.37	0.80	0.32	0.34	0.38	0.36	0.28	0.65	0.94	1.03	0.91	0.95	0.91	0.96	1.02	1.12	
130	1.72	1.01	0.33	0.37	0.37	0.37	0.34	0.81	1.34	1.39	1.07	1.23	1.23	1.30	1.27	1.44	
135	1.91	1.05	0.47	0.40	0.37	0.37	0.37	0.94	1.69	1.62	1.32	1.47	1.52	1.53	1.40	1.63	
140	1.87	1.03	0.48	0.42	0.36	0.38	0.42	0.95	1.67	1.75	1.40	1.54	1.69	1.59	1.44	1.72	
145	1.72	0.98	0.56	0.45	0.33	0.38	0.48	0.95	1.64	1.74	1.52	1.66	1.67	1.62	1.65	1.67	
150	1.49	0.90	0.68	0.45	0.42	0.42	0.63	0.95	1.51	1.62	1.66	1.75	1.78	1.70	1.88	1.60	
155	1.10	0.86	0.75	0.52	0.48	0.51	0.75	0.95	1.19	1.44	1.51	1.58	1.50	1.55	1.68	1.45	
160	1.02	0.84	0.76	0.59	0.55	0.58	0.78	0.89	1.07	1.17	1.33	1.45	1.38	1.34	1.42	1.35	
165	1.02	0.83	0.85	0.68	0.66	0.69	0.85	0.84	1.04	1.06	1.16	1.28	1.30	1.27	1.23	1.29	
170	1.07	0.94	1.04	0.96	0.86	0.98	1.09	0.89	1.19	1.21	1.33	1.64	1.84	1.87	1.68	1.72	
175	1.17	1.10	1.25	1.16	1.20	1.15	1.30	1.01	1.24	1.25	1.33	1.56	1.67	1.76	1.51	1.65	
180	1.09	1.14	1.30	1.29	1.35	1.21	1.37	1.04	1.09	1.11	1.15	1.30	1.29	1.38	1.24	1.39	

2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2017-06-10	Test Ambient:	25.2 ºC
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	AOK-150WIS-(D)-X(5700K)		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170259-O2	120.0	60	1.266	150.4	0.9904	8.95
	277.0	60	0.5803	147.9	0.9201	13.89
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method:

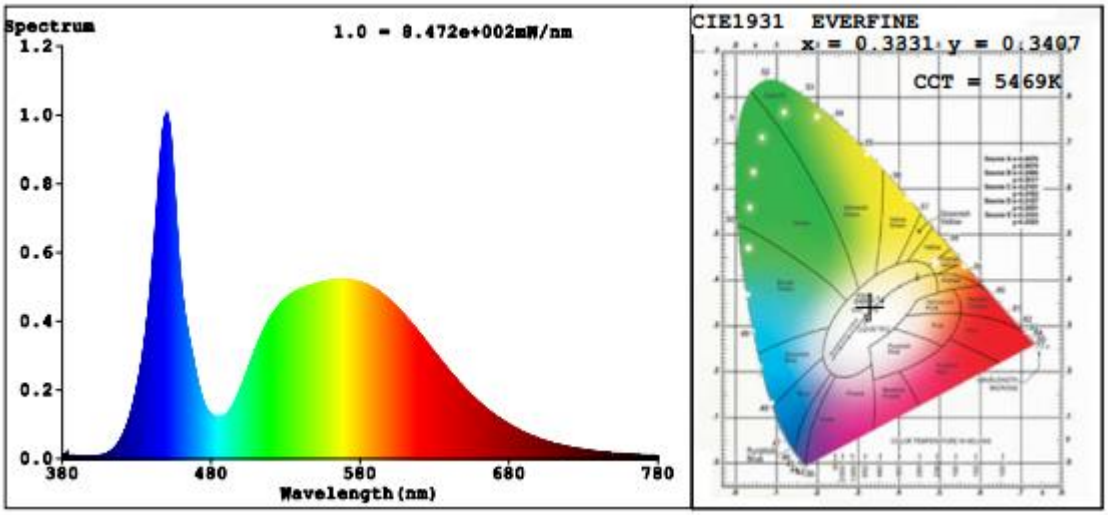
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	5469
Duv	-0.0005
Chromaticity (x, y)	x=0.3331 y=0.3407
Chromaticity (u', v')	u'=0.2075 v'=0.4775
Color Rendering Index (CRI)	76.2
R9	0

Special Color Rendering Indices			
R1	75	R9	0
R2	80	R10	51
R3	82	R11	75
R4	77	R12	48
R5	76	R13	76
R6	72	R14	90
R7	83	R15	71
R8	64	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.1 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	19880	19690	>=1000(-10%)	
Luminous Efficacy (lm/W)	132.18	133.13	Standard: >= 100(-3%)	Premium: >= 120(-3%)
Most worst Luminous/Highest Watts	130.92			

Spectral Power Distribution & Chromaticity Diagram



2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
AOK-150WIS-(D)-X(3000K)	3000K	19231	149.7	128.46
AOK-150WIS-(D)-X(3500K)	3500K	19361*1	150.1*2	128.99*3
AOK-150WIS-(D)-X(4000K)	4000K	19491*1	150.1*2	129.85*3
AOK-150WIS-(D)-X(4500K)	4500K	19620*1	150.1*2	130.71*3
AOK-150WIS-(D)-X(5000K)	5000K	19750*1	150.1*2	131.58*3
AOK-150WIS-(D)-X(5700K)	5700K	19880	150.4	132.18

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

19361= (19880-19231)/5+19231

19491= (19880-19231)/5+19361

19620= (19880-19231)/5+19491

19750= (19880-19231)/5+19620

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

150.1= (149.7+150.4)/2

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

128.99= 19361/150.1

129.85= 19491/150.1

130.71= 19620/150.1

131.58= 19750/150.1

3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-331	2 meter Integrating Sphere	2016-07-01	2017-06-30
ST-R-327	Spectral analysis system HAAS-2000	2016-07-01	2017-06-30
D204	Standard Lamp	2016-07-12	2017-07-11
PF2010	Power Meter for Integrating Sphere	2016-07-01	2017-06-30
GO-R5000	Goniophotometer system	2016-07-01	2017-06-30
D908S	Standard Lamp	2016-07-12	2017-07-11
PF210	Power Meter for Goniophotometer	2016-07-07	2017-07-06
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 ********