LM-79-08 Test Report

For

P.Q.L., Inc.

(Brand Name: Superior Life®)

2285 Ward Avenue / Simi Valley, CA 93065

Outdoor Pole/Arm-Mounted Area and Roadway Luminaires

Model name(s): 83938, 83939

Representative (Tested) Model: 83938 (3000K) 83939 (5000K)

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

Test & Report By:

Garman Mo

Engineer: Garman Mo

Date: May.24,2017

Review By:

Tommy Liang

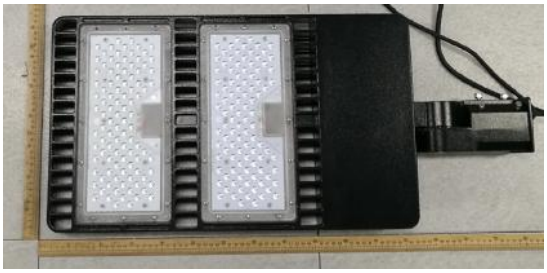
Manager: Tommy Liang

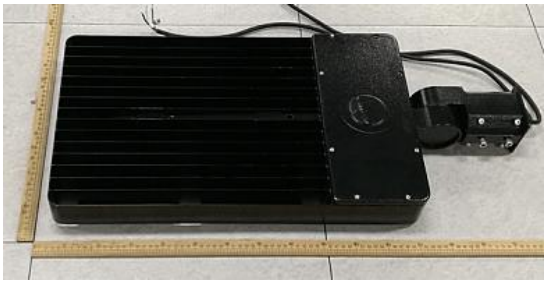
Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

1.1 Product Information:

Organization Name	P.Q.L., Inc.	
Brand Name	Superior Life®	
Model Number	83938, 83939	
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	180-528Vac, 50/60 Hz	
Nominal Power	200W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K,4500K,5000K	
LED Manufacturer	Philips Lumileds	
LED Model	LUXEON 3030 2D	
Sample Number	GZE1612102-AJ1(3000K);AJ2(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	May.21,2017
Date of Test	May.22,2017
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 277 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° C ± 1° 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 at277 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° C ± 1° C. The sample was operated at 277 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	2017-05-22	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	83938 (3000K)		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE161210	277.0	60	0.8326	227.9	0.9882	6.91
2-AJ1	480.0	60	0.4951	224.9	0.9464	14.27
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method:

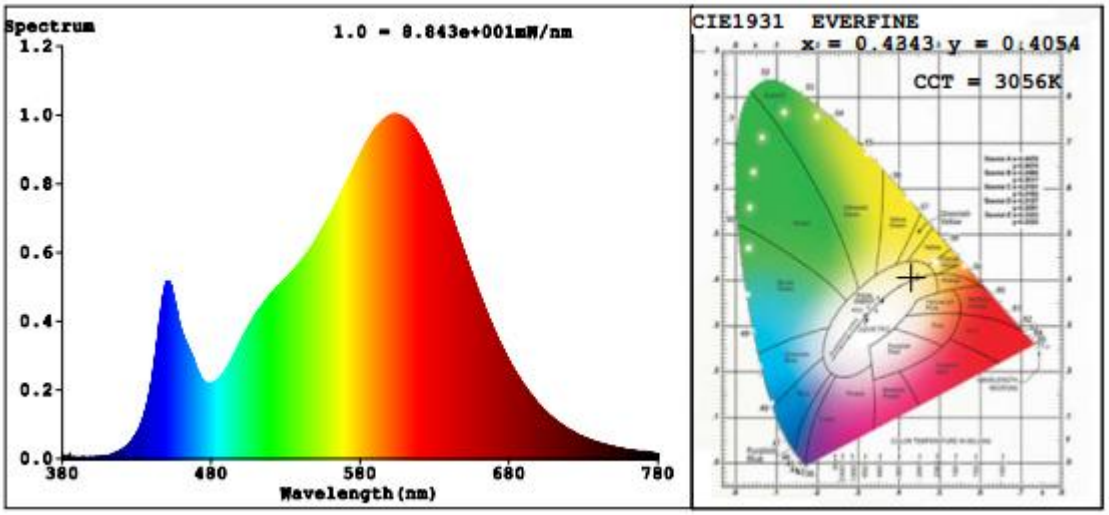
Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
CCT (K)	3056
Duv	0.0009
Chromaticity (x, y)	x=0.4343 y=0.4054
Chromaticity (u', v')	u'=0.2483 v'=0.5215
Color Rendering Index (CRI)	83.3
R9	10

Special Color Rendering Indices			
R1	82	R9	10
R2	91	R10	80
R3	97	R11	80
R4	81	R12	71
R5	82	R13	84
R6	89	R14	99
R7	84	R15	74
R8	61	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result		DLC V4.2 Pass Criteria	
Test Voltage (V)	277.0	480.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	22765	22812	>=1000 (±10%)	
Luminous Efficacy (lm/W)	99.89	101.43	Standard: >=	Premium: >=
Most worst Luminous/Highest Watts	99.89		100(-3%)	120(-3%)
Zonal lumens in the 0-90° zone (%)	99.8	--	>=100(-1)	
Zonal lumens in the 80-90° zone (%)	0.6	--	<=10(+3)	
Beam Angle (°)	83.5	--	--	
Center Beam Candle Power (cd)	3461	--	--	

Spectral Power Distribution & Chromaticity Diagram

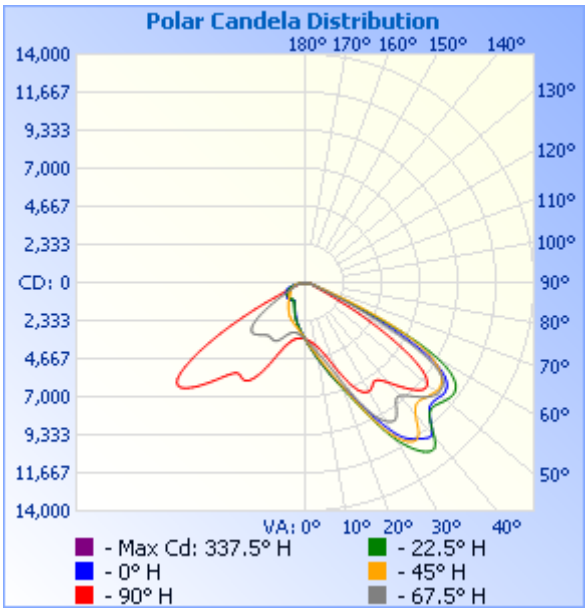


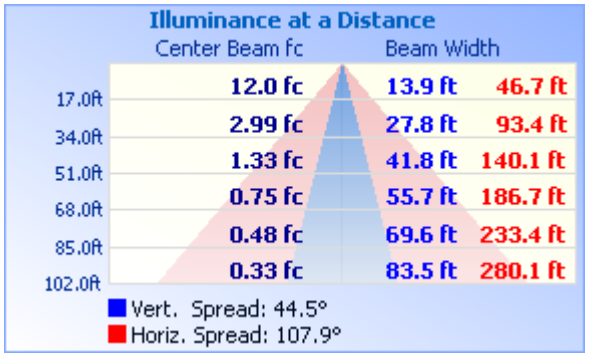
Zonal Lumen Tabulation

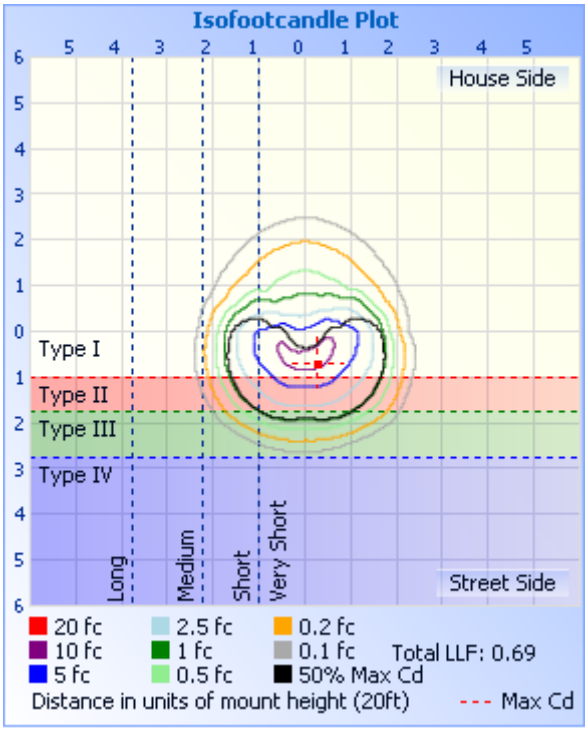
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	4,119.0	18.1%
0-40	8,446.6	37.1%
0-60	19,462.7	85.5%
60-90	3,256.8	14.3%
70-100	759.8	3.3%
90-120	12.7	0.1%
0-90	22,719.5	99.8%
90-180	44.0	0.2%
0-180	22,763.5	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	342.4	1.5%	90-100	0.9	0%
10-20	1,176.8	5.2%	100-110	3.9	0%
20-30	2,599.8	11.4%	110-120	7.8	0%
30-40	4,327.6	19.0%	120-130	9.6	0%
40-50	5,318.5	23.4%	130-140	8.8	0%
50-60	5,697.6	25.0%	140-150	6.1	0%
60-70	2,497.9	11.0%	150-160	3.9	0%
70-80	617.7	2.7%	160-170	2.1	0%
80-90	141.2	0.6%	170-180	0.9	0%

Photometric Data







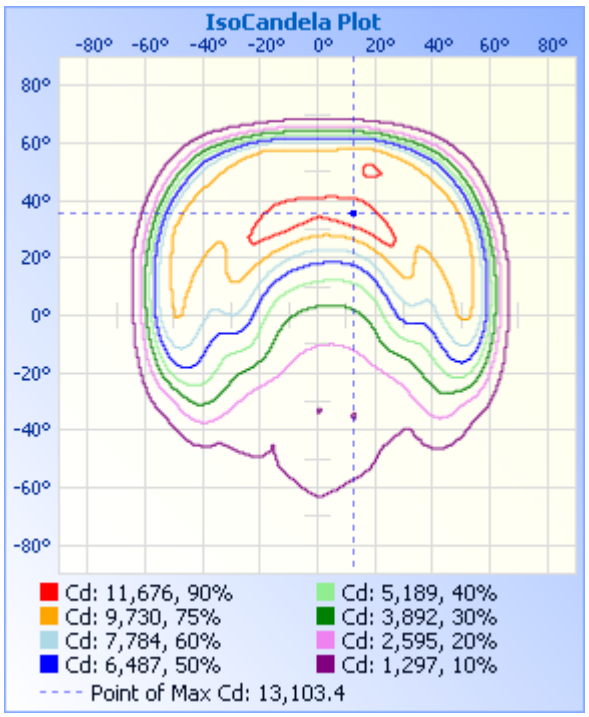


Table--1 UNIT: ×10cd

γ (DEG) \ C (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338		
0	346	346	346	346	346	346	346	346	346	346	346	346	346	346	346	346		
5	342	363	383	398	407	407	399	382	363	341	321	306	299	299	308	322		
10	351	393	431	461	481	482	467	434	394	351	308	275	259	261	280	311		
15	382	442	495	542	575	578	557	510	454	385	308	248	219	225	260	317		
20	452	534	589	644	688	700	684	640	567	448	314	219	181	189	243	346		
25	585	702	739	788	840	881	876	830	707	508	310	188	149	157	224	391		
30	694	910	974	1008	1045	1108	1083	979	771	511	285	161	132	136	201	401		
35	694	1000	1208	1239	1170	1265	1180	977	738	503	259	143	130	130	178	395		
40	741	898	1102	1262	1209	1228	1049	905	803	543	237	135	135	130	158	418		
45	883	1002	1049	1128	1078	1092	1010	990	925	565	202	130	139	132	138	443		
50	998	1115	1101	1163	1082	1122	1041	1058	975	502	156	129	141	132	124	426		
55	895	1094	1101	1174	1057	1125	1022	1027	790	310	119	126	138	130	113	313		
60	518	802	911	994	811	950	870	735	384	139	103	119	134	123	106	165		
65	159	309	483	447	336	409	475	259	108	87.5	91.5	110	125	113	92.9	90.3		
70	70.6	79.2	125	110	102	88.6	126	74.7	66.2	69.3	74.0	95.2	112	97.3	75.8	70.1		
75	48.7	49.5	51.7	52.7	56.2	55.7	58.9	50.2	47.8	50.4	62.2	74.3	86.9	75.3	61.8	48.1		
80	29.1	28.1	28.0	23.9	24.3	24.6	29.6	30.3	30.9	31.2	49.3	45.7	40.2	45.9	46.2	29.4		
85	10.8	10.7	7.54	5.04	4.47	5.48	8.83	13.5	13.0	13.0	18.3	12.4	13.8	10.9	15.6	11.6		
90	0.10	0.10	0.13	0.11	0.13	0.18	0.20	0.16	0.10	0.08	0.07	0.06	0.06	0.13	0.11	0.08		
95	0.04	0.04	0.06	0.08	0.09	0.08	0.07	0.05	0.02	0.04	0.07	0.09	0.10	0.11	0.11	0.05		
100	0.06	0.04	0.05	0.08	0.11	0.08	0.06	0.05	0.07	0.12	0.25	0.35	0.29	0.37	0.36	0.19		
105	0.28	0.13	0.09	0.11	0.13	0.11	0.08	0.14	0.29	0.43	0.64	0.69	0.64	0.72	0.79	0.56		
110	0.70	0.34	0.14	0.13	0.19	0.14	0.12	0.40	0.67	0.90	0.98	1.02	0.91	1.04	1.05	1.04		
115	1.14	0.61	0.24	0.13	0.19	0.15	0.14	0.62	1.04	1.29	1.21	1.12	1.22	1.08	1.27	1.32		
120	1.40	0.80	0.32	0.17	0.20	0.16	0.21	0.74	1.20	1.43	1.51	1.51	1.32	1.38	1.55	1.41		
125	1.53	1.00	0.37	0.21	0.23	0.20	0.23	0.82	1.27	1.52	1.55	1.62	1.60	1.54	1.64	1.58		
130	1.57	1.04	0.40	0.24	0.23	0.20	0.28	0.86	1.42	1.59	1.55	2.14	1.82	2.00	1.73	1.68		
135	1.52	1.04	0.42	0.30	0.23	0.20	0.30	0.84	1.39	1.51	1.52	2.06	1.83	2.00	1.59	1.64		
140	1.47	0.98	0.42	0.32	0.23	0.23	0.30	0.79	1.24	1.49	1.17	1.89	1.58	1.77	1.32	1.71		
145	1.24	0.80	0.43	0.37	0.21	0.27	0.30	0.60	1.00	1.20	1.09	1.59	1.50	1.55	1.42	1.55		
150	1.09	0.71	0.50	0.39	0.30	0.32	0.39	0.57	0.91	1.02	1.20	1.47	1.57	1.45	1.54	1.36		
155	0.84	0.66	0.58	0.45	0.41	0.41	0.46	0.58	0.65	0.87	1.03	1.22	1.29	1.26	1.40	1.21		
160	0.75	0.60	0.60	0.52	0.48	0.47	0.50	0.56	0.67	0.74	0.78	1.00	1.07	1.05	1.11	1.03		
165	0.74	0.59	0.64	0.56	0.55	0.54	0.55	0.53	0.68	0.64	0.66	0.84	0.91	0.93	0.88	0.99		
170	0.84	0.69	0.78	0.71	0.62	0.72	0.73	0.61	0.79	0.78	0.82	1.09	1.41	1.47	1.42	1.33		
175	0.88	0.77	0.87	0.84	0.91	0.84	0.85	0.70	0.81	0.81	0.84	1.00	1.17	1.29	1.18	1.18		
180	0.78	0.79	0.87	0.88	0.95	0.85	0.91	0.72	0.77	0.77	0.76	0.87	0.87	0.95	0.86	0.92		

2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2017-05-22	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	83939 (5000K)		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE161210	277.0	60	0.8397	228.5	0.9824	7.59
2-AJ2	480.0	60	0.4995	225.5	0.9405	14.80
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method :

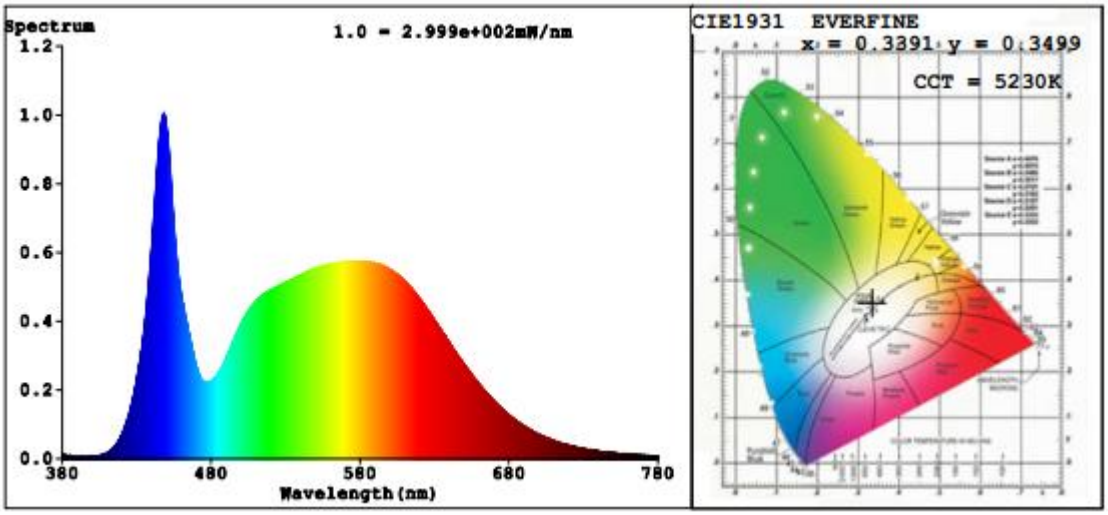
Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
CCT (K)	5230
Duv	0.0016
Chromaticity (x, y)	x=0.3391 y=0.3499
Chromaticity (u', v')	u'=0.2080 v'=0.4829
Color Rendering Index (CRI)	83.4
R9	12

Special Color Rendering Indices			
R1	82	R9	12
R2	87	R10	69
R3	90	R11	85
R4	85	R12	66
R5	84	R13	83
R6	83	R14	95
R7	87	R15	77
R8	70	--	--

Photometric Measurement– Sphere-Spectroradiometer Method :

Parameter	Result		DLC V4.2 Pass Criteria	
Test Voltage (V)	277.0	480.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	23577	23599	>=1000 (±10%)	
Luminous Efficacy (lm/W)	103.18	104.65	Standard: >=	Premium: >=
Most worst Luminous/Highest Watts	103.18		100(-3%)	120(-3%)

Spectral Power Distribution & Chromaticity Diagram



2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
83938 (3000 K)	3000K	22765	227.9	99.89
839XX (3500 K)	3500K	22968*1	228.2*2	100.65*3
839XX (4000 K)	4000K	23171*1	228.2*2	101.54*3
839XX (4500 K)	4500K	23374*1	228.2*2	102.43*3
83938 (5000 K)	5000K	23577	228.5	103.18

*1: This value is calculated and the calculation formula is as below:
22968= (23577-22765)/4+22765
23171= (23577-22765)/4+22968
23374= (23577-22765)/4+23171

*2: This value is calculated and the calculation formula is as below:
228.2= (227.9+228.5)/2

*3: This value is calculated and the calculation formula is as below:
100.65= 22968/228.2
101.54= 23171/228.2
102.43= 23374/228.2

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 ******