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-110WIS-(D)-X

Representative (Tested) Model: AOK-110WIS-(D)-X(3000K)
AOK-110WIS-(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-110WIS-(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	110W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K,4500K,5000K,5700K	
LED Manufacturer	Philips Lumileds	
LED Model	LUXEON 3030 2D	
Sample Number	GZE170259-N1(3000K),N2(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 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	AOK-110WIS-(D)-X(3000K)		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170259-N1	120.0	60	0.9663	115.2	0.9935	9.28
	277.0	60	0.4413	113.8	0.9309	13.57
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method:

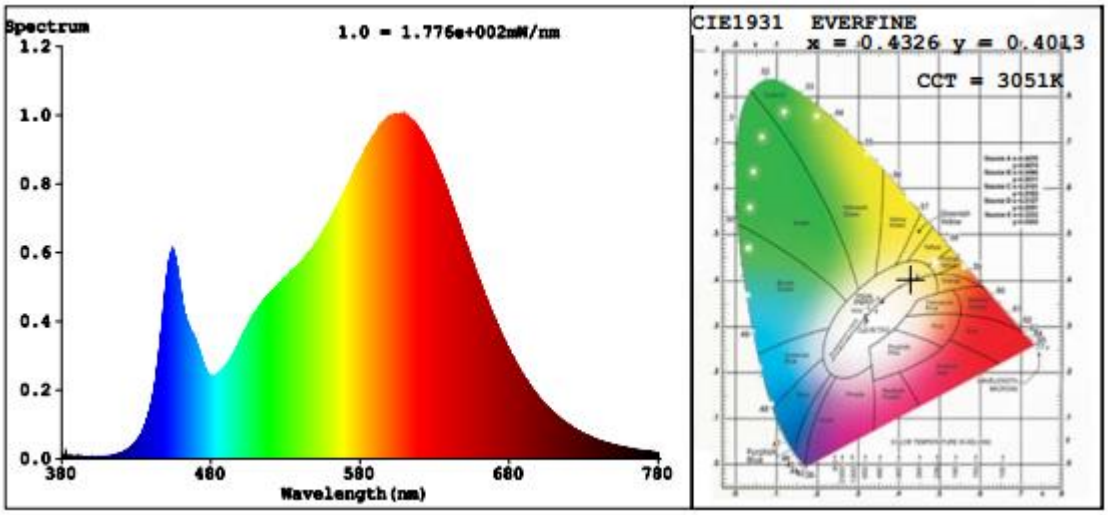
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	3051
Duv	-0.0005
Chromaticity (x, y)	x=0.4326 y=0.4013
Chromaticity (u', v')	u'=0.2490 v'=0.5196
Color Rendering Index (CRI)	85.4
R9	21

Special Color Rendering Indices			
R1	85	R9	21
R2	94	R10	86
R3	96	R11	83
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)	14843	14832	>=1000(-10%)	
Luminous Efficacy (lm/W)	128.85	130.33	Standard: >= 100(-3%)	Premium: >= 120(-3%)
Most worst Luminous/Highest Watts	128.75			
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)	3531	--	--	

Spectral Power Distribution & Chromaticity Diagram



Zonal Lumen Tabulation

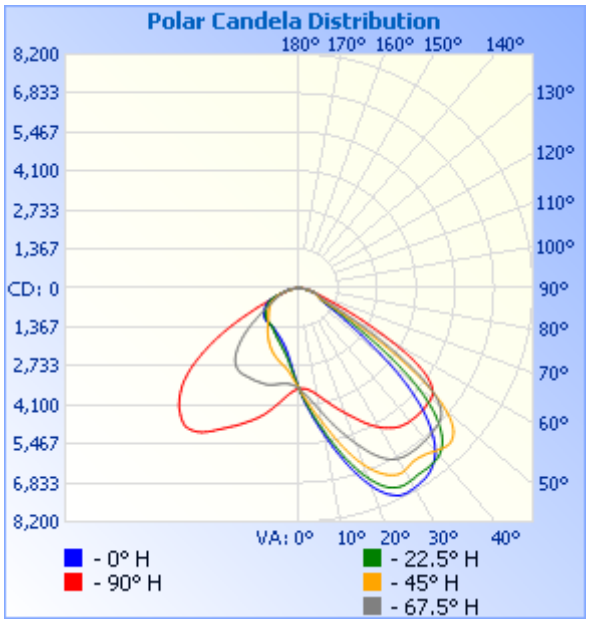
Zonal Lumen Summary

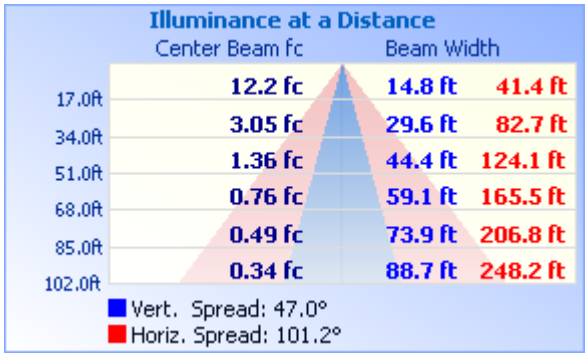
Zone	Lumens	% Luminaire
0-30	3,841.4	25.9%
0-40	6,984.7	47%
0-60	13,042.4	87.9%
60-90	1,775.4	12%
70-100	700.9	4.7%
90-120	3.8	0%
0-90	14,817.7	99.8%
90-180	27.8	0.2%
0-180	14,845.5	100%

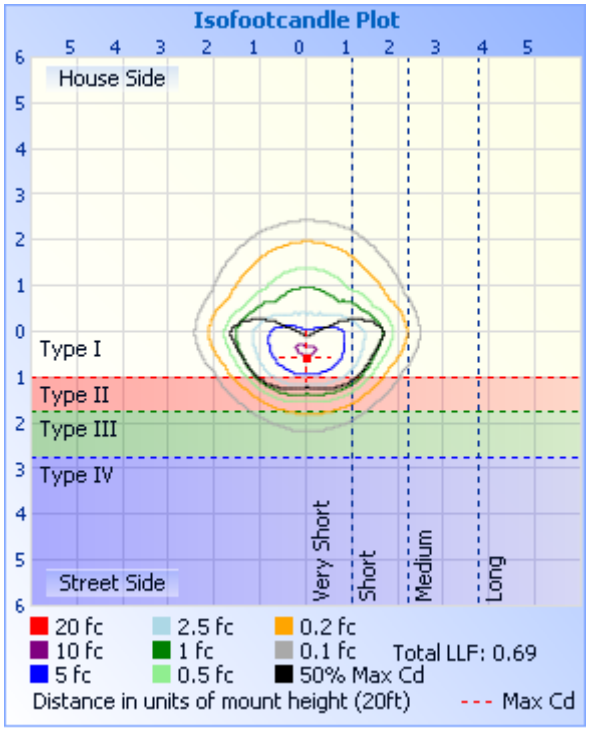
Lumens Per Zone

Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	352.6	2.4%	90-100	0.1	0%
10-20	1,218.3	8.2%	100-110	0.9	0%
20-30	2,270.5	15.3%	110-120	2.8	0%
30-40	3,143.2	21.2%	120-130	5.1	0%
40-50	3,542.1	23.9%	130-140	6.3	0%
50-60	2,515.7	16.9%	140-150	5.5	0%
60-70	1,074.6	7.2%	150-160	3.8	0%
70-80	559.3	3.8%	160-170	2.2	0%
80-90	141.4	1.0%	170-180	0.9	0%

Photometric Data







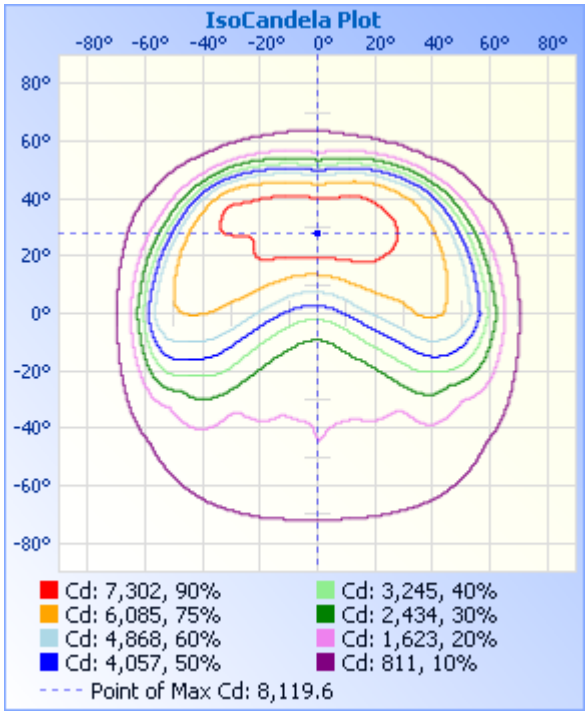


Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338		
0	3531	3531	3531	3531	3531	3531	3531	3531	3531	3531	3531	3531	3531	3531	3531	3531		
5	3710	4007	4214	4343	4353	4276	4106	3867	3571	3265	3010	2853	2806	2886	3083	3383		
10	4094	4664	5057	5256	5275	5127	4818	4395	3815	3202	2693	2410	2329	2454	2814	3401		
15	4559	5419	6005	6299	6349	6133	5698	5066	4203	3263	2522	2147	2054	2198	2659	3506		
20	4948	6069	6844	7240	7379	7092	6585	5791	4642	3371	2408	1976	1891	2016	2509	3569		
25	5329	6596	7320	7801	8025	7721	7217	6501	5148	3461	2285	1849	1782	1872	2329	3588		
30	5735	6923	7418	7791	8093	7812	7394	6906	5633	3579	2136	1745	1695	1748	2128	3595		
35	6156	7121	7365	7680	7936	7754	7275	6967	5959	3674	1965	1650	1638	1653	1921	3599		
40	6258	6978	7314	7552	7423	7647	7450	6928	6076	3584	1756	1586	1628	1607	1704	3469		
45	5951	6453	7021	7069	6228	7024	7564	6843	6089	3275	1544	1551	1621	1580	1524	3089		
50	5365	5525	5919	5523	4165	5477	6783	6455	6035	2785	1381	1502	1578	1529	1401	2487		
55	4356	4016	3757	2966	1973	2908	4329	4766	5532	2129	1264	1422	1502	1440	1292	1782		
60	2987	1958	1412	1126	991	1211	1599	2125	3792	1455	1148	1302	1377	1308	1166	1230		
65	1623	867	742	742	790	777	772	945	1787	990	1004	1173	1218	1169	1012	932		
70	822	671	614	627	666	662	637	697	847	747	833	946	918	919	831	741		
75	493	501	460	454	400	473	473	526	521	557	594	609	612	580	581	548		
80	320	330	247	258	197	264	266	364	334	357	342	371	422	357	339	332		
85	132	106	82.8	73.8	52.2	76.5	88.7	125	145	123	137	162	224	159	134	113		
90	0.78	0.66	0.42	0.24	0.31	0.31	0.49	0.56	0.00	0.00	0.00	0.12	0.00	0.24	0.00	0.00		
95	0.37	0.29	0.21	0.21	0.00	0.31	0.06	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
100	0.65	0.19	0.28	0.31	0.42	0.39	0.00	0.06	0.54	0.00	0.00	0.00	0.00	0.00	0.06	0.13		
105	3.10	0.71	0.48	0.54	0.83	0.54	0.54	0.54	1.56	0.72	0.36	0.18	0.00	0.36	0.67	1.27		
110	5.68	1.79	0.78	1.14	1.46	1.20	0.78	1.33	3.05	1.97	1.08	1.02	0.60	1.20	2.23	3.09		
115	7.30	3.04	1.49	1.32	1.58	1.44	1.42	2.42	4.13	4.01	3.30	1.42	1.86	1.60	4.29	5.03		
120	8.79	4.24	1.79	1.73	1.92	1.68	1.55	3.39	5.62	5.74	5.50	4.38	2.95	4.51	6.27	6.48		
125	10.3	5.79	2.06	2.28	2.54	2.40	1.81	4.72	6.94	7.60	6.75	6.96	6.62	7.27	7.66	8.48		
130	13.1	7.35	2.33	2.44	2.45	2.40	2.11	5.93	10.1	10.4	8.07	9.18	9.02	9.74	9.47	10.9		
135	14.6	7.75	2.69	2.52	2.36	2.43	2.41	7.08	12.7	12.1	10.0	11.3	11.3	11.7	10.3	12.3		
140	14.1	7.68	3.29	2.65	2.26	2.45	2.67	7.38	12.5	13.1	10.5	11.8	12.7	12.0	10.9	13.0		
145	12.9	7.23	3.94	3.06	2.16	2.58	3.31	7.50	12.1	12.8	11.4	12.5	12.6	12.1	12.4	12.5		
150	11.2	6.75	4.90	3.47	2.73	3.06	4.40	7.63	11.2	11.9	12.1	12.9	13.1	12.6	14.3	12.1		
155	8.21	6.35	5.34	3.62	3.30	3.66	5.37	7.28	8.31	10.6	11.2	11.9	11.0	11.5	12.7	10.8		
160	7.12	6.16	5.50	4.37	3.90	4.32	5.67	6.84	8.14	8.48	9.91	10.7	10.1	10.1	10.7	10.1		
165	7.50	6.02	6.15	4.67	4.80	5.28	6.21	6.29	8.22	7.77	8.42	9.53	9.49	9.61	9.35	9.56		
170	7.89	6.69	7.76	7.18	6.30	7.20	7.96	6.59	8.91	8.96	10.1	12.0	13.6	14.1	12.5	12.8		
175	8.61	8.00	9.02	8.33	8.94	8.52	9.51	7.38	9.21	9.20	11.2	11.4	12.3	13.1	11.4	12.2		
180	7.95	8.37	9.50	9.23	10.1	9.36	10.4	7.50	8.02	8.19	8.42	9.53	9.31	10.3	9.28	10.3		

2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2017-06-10	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	AOK-110WIS-(D)-X(5700K)		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170259-N2	120.0	60	0.9746	115.8	0.9901	9.81
	277.0	60	0.4455	114.4	0.9271	14.05
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method:

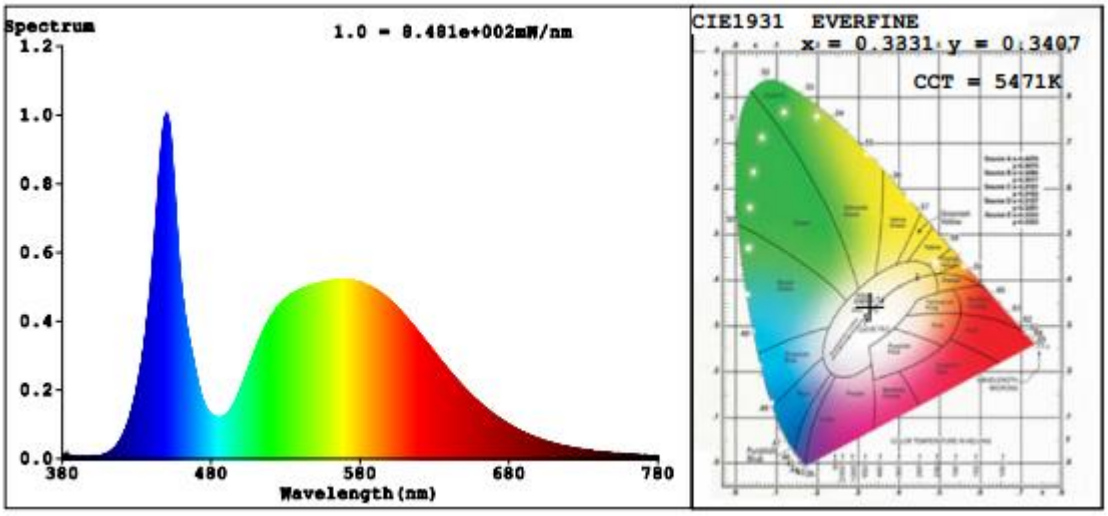
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	5471
Duv	-0.0005
Chromaticity (x, y)	x=0.3331 y=0.3407
Chromaticity (u', v')	u'=0.2075 v'=0.4775
Color Rendering Index (CRI)	76.2
R9	0

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)	15304	15285	>=1000(-10%)	
Luminous Efficacy (lm/W)	132.16	133.61	Standard: >= 100(-3%)	Premium: >= 120(-3%)
Most worst Luminous/Highest Watts	131.99			

Spectral Power Distribution & Chromaticity Diagram



2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
AOK-110WIS-(D)-X(3000K)	3000K	14843	115.2	128.85
AOK-110WIS-(D)-X(3500K)	3500K	14935*1	115.5*2	129.31*3
AOK-110WIS-(D)-X(4000K)	4000K	15027*1	115.5*2	130.10*3
AOK-110WIS-(D)-X(4500K)	4500K	15120*1	115.5*2	130.91*3
AOK-110WIS-(D)-X(5000K)	5000K	15212*1	115.5*2	131.71*3
AOK-110WIS-(D)-X(5700K)	5700K	15304	115.8	132.16

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

14935= (15304-14843)/5+14843

15027= (15304-14843)/5+14935

15120= (15304-14843)/5+15027

15212= (15304-14843)/5+15212

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

115.5= (115.2+115.8)/2

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

129.31= 14935/115.5

130.10= 15027/115.5

130.91= 15120/115.5

131.71= 15212/115.5

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 ********