



<b>Energy Efficiency TEST REPORT Of SASO-2927</b>	
<b>Report reference No.:</b>	LCS201216095BS
<b>Prepare by.....:</b>	Seth Cai (Project Engineer)
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<b>Approved by.....:</b>	Jesse Liu (Manager)
<b>Date of issue.....:</b>	September 03, 2021
<b>Contents.....:</b>	18 pages
<b>Testing laboratory</b>	
<b>Name.....:</b>	Shenzhen Southern LCS Compliance Testing Laboratory Ltd.
<b>Address.....:</b>	101-201, No.39 Buliding, Xialang Industrial Zone, Heshuikou Community, Matian Street, Guangming District, Shenzhen, China
<b>Testing location.....:</b>	As above
<b>Client</b>	
<b>Name.....:</b>	AOK Industrial Company Limited
<b>Address.....:</b>	Building 1, Shengzuozhi Technology Industrial Park, Shajing Street, Shenzhen City, Guangdong, P.R. China
<b>Manufacturer</b>	
<b>Name.....:</b>	AOK Industrial Company Limited
<b>Address.....:</b>	Building 1, Shengzuozhi Technology Industrial Park, Shajing Street, Shenzhen City, Guangdong, P.R. China
<b>Test specification</b>	
<b>Standard.....:</b>	SASO 2927: 2019 Energy efficiency functionality and labelling requirements for lighting products – Part 3: Street lighting
<b>Test procedure.....:</b>	SASO 2927: 2019 Energy efficiency functionality and labelling requirements for lighting products – Part 3: Street lighting LM-84-14 Approved Method for Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires
<b>Non-standard test method...:</b>	N/A

**TRF No. SASO-2927:2019**

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<b>Test item Description</b> .....	LED STREET LIGHT
<b>Trademark</b> .....	<b>AOK</b>
<b>Model and/or type reference</b> .....	AOK-200WiL02-NV-L3-00-40
<b>Rating(s)(V/Hz)</b> .....	AC120-277V, 50/60Hz, 200W, 2200mA
<b>Test case verdicts</b>	
Test case does not apply to the test object ..	N(N/A)
Test item does meet the requirement .....	P(Pass)
Test item does not meet the requirement ...	F(Fail)
<b>Testing</b>	
Date of receipt of test item .....	October 10, 2020
Date(s) of performance of test.....	October 10, 2020 – June 21, 2021
<b>Test item particulars:</b>	
<b>Lamp type:</b>	
- Indirect	<input checked="" type="checkbox"/>
- Direct	<input type="checkbox"/>
<b>Techonology:</b>	
- Lamp	<input type="checkbox"/>
- Luminaires	<input checked="" type="checkbox"/>
- Ballsts and Control Gears	<input type="checkbox"/>
-Use types for luminaires	General (artificial) lighting
<b>Control gear:</b>	
- Integrated	<input type="checkbox"/>
- External	<input checked="" type="checkbox"/>
<b>Use of lamp:</b>	
- Indoor	<input type="checkbox"/>
- Outdoor	<input checked="" type="checkbox"/>
- Industry	<input type="checkbox"/>
<b>Envelope transparency:</b>	
- Clear lamp	<input type="checkbox"/>
- Non-clear lamp	<input checked="" type="checkbox"/>
<b>Dimmable lamp:</b>	<input checked="" type="checkbox"/>
<b>7-Pin NEMA Socket:</b>	<input checked="" type="checkbox"/>
<b>Sensor Ready Socket:</b>	<input type="checkbox"/>
<b>SPD Work temperature of 80°C:</b>	<input checked="" type="checkbox"/>

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<b>Meets 3G vibration:</b>	<input checked="" type="checkbox"/>
<b>Meets 1.5G vibration:</b>	<input checked="" type="checkbox"/>
<b>Declared data:</b>	
Rated voltage .....(V): AC120-277V	
Rated lamp power .....(W): 200W	
Rated useful luminous flux.....(lm): 30000lm	
Rated Ra .....: 80	
Rated Beam angle.....(° ): 110°	
Rated CCT .....(K): 4000K	
Rated power factor.....: 0.98	
LED chip Efficacy at 25°C.....lm/w: 168 lm/w	
Rated Energy Efficacy rating.....: Class A	
Rated EEI.....: 0.089	
Over current protection.....: 10KA	
Over voltage protection.....: 10KV	
Electrical protection class.....: I	
Ingress protection.....: IP66	
Impact protection.....: IK08	
Control unit withstand a temperature.....: -10-80°C	
After 2,500 hours .....: 6 Classification	
Withstand wind speed .....: 150km/h	
Rated No Load Power of Control Gear.....: 0.5W	
Rated Stand-By Power of Control Gear.....: 0.5W	
Energy Efficiency of Control Gear.....: 92%	
IP of Control Gear.....: IP66	
Rated life time .....(h): 50000h	
<b>Attachments:</b>	
The test report includes: Attachment 1(S) of product photos	
<b>General remarks</b>	
The test results presented in this report relate only to the object tested.	
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.	
"(see Enclosure #)" refers to additional information appended to the report.	
"(see appended table)" refers to a table appended to the report.	
Throughout this report a comma (point) is used as the decimal separator.	
<b>Remarks</b>	
N/A	

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## Summary of test results

Power(W)( 120V test voltage).....	:	200.48
Corrected power Pcor (W) ( 120V test voltage).....	:	196.47
Useful luminous flux $\Phi_{use}$ (lm) ( 120V test voltage)..	:	29701.87
Reference power Pref (W) ( 120V test voltage).....	:	2180.41
Power(W)( 277V test voltage).....	:	196.38
Corrected power Pcor (W) ( 277V test voltage).....	:	192.46
Useful luminous flux $\Phi_{use}$ (lm) ( 277V test voltage)..	:	28307.73
Reference power Pref (W) ( 277est voltage).....	:	2078.07
Lamp survival factor at 6000h (%).....	:	100%
Lamp maintenance at 6000h (%).....	:	91.41%
Number of switching cycles before failure.....	:	15000
Starting time (s).....	:	0.214
Lamp warm-up time to 95 % $\Phi$ (s).....	:	N/A
Premature failure rated at 1000h(%).....	:	0
Lamp displacement factor.....	:	0.996
Color rendering index(%).....	:	82.9
Color Temp(K).....	:	3960
Beam angle(° ).....	:	111.1
Efficacy (lm/W).....	:	148.15
Energy Efficiency Index (EEI) ( 120V test voltage)....	:	0.090
Energy efficiency rating ( 120V test voltage).....	:	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E <input type="checkbox"/> F <input type="checkbox"/> G
Energy Efficiency Index (EEI) ( 277V test voltage)....	:	0.093
Energy efficiency rating ( 277V test voltage).....	:	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E <input type="checkbox"/> F <input type="checkbox"/> G



## Measurement conditions

### 1、Lamp Pre-Conditioning

The compact fluorescent lamps were pre-conditioned for 100 hours (mounted in base-up position), before the initial lumen measurement.

No pre-conditioning for LED lamps before the initial lumen measurement.

### 2、Light Output Measurements

Total light output (luminous flux) was measured using a 2 meters integrating sphere spectral lamp measurement system. Temperature was measured at a position inside the sphere shielded from direct light. Relative humidity of 65% was measured at a position in the testing laboratory.

Spectral radiant flux measurements were done by using spectroradiometer attached to the detector port of the integrating sphere. The sample was operated at 120VAC 60Hz and 277VAC 60Hz in normal operation.

The sample was allowed to stabilise before measurements were made. The integrating sphere spectroradiometer system is calibrated by the reference/standard lamps which are traceable to National Institute of Metrology P.R. CHINA. Lamp efficacy (lumens per watt) for each lamp model was then calculated based on the luminous flux result. Electrical measurements, including voltage, power and power factor, were measured with YOKOGAWA Digital Power Meter, model WT310.

### 3、Light distribution measurements

Light Distribution was measured using a GO-R5000 Type-C Full-field Speed Goniophotometer. Temperature 25°C and relative humidity of 60% was measured at a position in the testing laboratory. The lamp rotates only around the fixed vertical axle in the prescribed burning position. The lamp and mirror permit the measurement of luminous intensity at the direction of any horizontal or vertical angle without tilting the lamp. The lamp was allowed to stabilize before measurements were made.

### 4、Equipment List

Instrument	Equipment ID	Model	Calibration Date	Calibration Due Date
Full-field Speed Goniophotometer	SLCS-S-112	GO-R5000	2020/07/02	2021/07/01
Digital Power Meter	SLCS-S-103	PF2010	2020/06/24	2021/06/23
AC Testing Power Source	SLCS-S-115	DPS1060	2020/06/24	2021/06/23
Total Spectral Radiant Flux Standard Lamp	SLCS-S-143	D908S	2020/07/08	2021/07/07
2m Integrating Sphere System	SLCS-S-038	SPR-3000	2020/07/02	2021/07/01
Digital Power Meter	SLCS-S-058	WT310	2020/06/24	2021/06/23
AC Testing Power Source	SLCS-S-111	APW-105N	2020/06/24	2021/06/23
Standard Lamp	SLCS-S-118	S11010017	2020/07/08	2021/07/07
Power Meter	SLCS-S-060	PF9800	2020/06/24	2021/06/23
Flicker Photometer	SLCS-S-119	FP-210	2020/06/24	2021/06/23



SASO-2927:2019																												
Clause	Requirement - Test		Result - Remark	Verdict																								
10	Requirements for Street Lighting Lamps, Control Gears and Non-integrated Luminaires / Luminaires			--																								
10.1	Energy efficiency requirements			P																								
	Integrated luminaire and led chips shall comply with energy efficiency requirements specified in table 14			P																								
Table 14	Integrated luminaire Efficacy ≥ 120 and ≥ 85% of LED chips Efficacy			P																								
	LED chips Efficacy ≥ 140 at 25 °C			P																								
	High pressure sodium shall comply with energy efficiency requirements specified in table 15 and table 16			N																								
	Ra ≤ 60			N																								
Table 15	<table><tr><th>Nominal Lamp Wattage [W]</th><th>Rated Lamp Efficacy [Lm/W] - Clear Lamps</th><th>Rated Lamp Efficacy [Lm/W] - Not Clear Lamps</th></tr><tr><td>W ≤ 45</td><td>≥ 60</td><td>≥ 60</td></tr><tr><td>45 &lt; W ≤ 55</td><td>≥ 80</td><td>≥ 70</td></tr><tr><td>55 &lt; W ≤ 75</td><td>≥ 90</td><td>≥ 80</td></tr><tr><td>55 &lt; W ≤ 75</td><td>≥ 100</td><td>≥ 95</td></tr><tr><td>105 &lt; W ≤ 155</td><td>≥ 110</td><td>≥ 105</td></tr><tr><td>155 &lt; W ≤ 255</td><td>≥ 125</td><td>≥ 115</td></tr><tr><td>255 &lt; W ≤ 605</td><td>≥ 135</td><td>≥ 130</td></tr></table>	Nominal Lamp Wattage [W]	Rated Lamp Efficacy [Lm/W] - Clear Lamps	Rated Lamp Efficacy [Lm/W] - Not Clear Lamps	W ≤ 45	≥ 60	≥ 60	45 < W ≤ 55	≥ 80	≥ 70	55 < W ≤ 75	≥ 90	≥ 80	55 < W ≤ 75	≥ 100	≥ 95	105 < W ≤ 155	≥ 110	≥ 105	155 < W ≤ 255	≥ 125	≥ 115	255 < W ≤ 605	≥ 135	≥ 130			N
Nominal Lamp Wattage [W]	Rated Lamp Efficacy [Lm/W] - Clear Lamps	Rated Lamp Efficacy [Lm/W] - Not Clear Lamps																										
W ≤ 45	≥ 60	≥ 60																										
45 < W ≤ 55	≥ 80	≥ 70																										
55 < W ≤ 75	≥ 90	≥ 80																										
55 < W ≤ 75	≥ 100	≥ 95																										
105 < W ≤ 155	≥ 110	≥ 105																										
155 < W ≤ 255	≥ 125	≥ 115																										
255 < W ≤ 605	≥ 135	≥ 130																										
	Ra > 60			N																								
Table 16	<table><tr><th>Nominal Lamp Wattage [W]</th><th>Rated Lamp Efficacy [Lm/W] - Clear Lamps</th><th>Rated Lamp Efficacy [Lm/W] - Not Clear Lamps</th></tr><tr><td>W ≤ 55</td><td>≥ 60</td><td>≥ 60</td></tr><tr><td>55 &lt; W ≤ 75</td><td>≥ 75</td><td>≥ 70</td></tr><tr><td>75 &lt; W ≤ 105</td><td>≥ 80</td><td>≥ 75</td></tr><tr><td>105 &lt; W ≤ 155</td><td>≥ 80</td><td>≥ 75</td></tr><tr><td>155 &lt; W ≤ 255</td><td>≥ 80</td><td>≥ 75</td></tr><tr><td>255 &lt; W ≤ 405</td><td>≥ 85</td><td>≥ 75</td></tr></table>	Nominal Lamp Wattage [W]	Rated Lamp Efficacy [Lm/W] - Clear Lamps	Rated Lamp Efficacy [Lm/W] - Not Clear Lamps	W ≤ 55	≥ 60	≥ 60	55 < W ≤ 75	≥ 75	≥ 70	75 < W ≤ 105	≥ 80	≥ 75	105 < W ≤ 155	≥ 80	≥ 75	155 < W ≤ 255	≥ 80	≥ 75	255 < W ≤ 405	≥ 85	≥ 75			N			
Nominal Lamp Wattage [W]	Rated Lamp Efficacy [Lm/W] - Clear Lamps	Rated Lamp Efficacy [Lm/W] - Not Clear Lamps																										
W ≤ 55	≥ 60	≥ 60																										
55 < W ≤ 75	≥ 75	≥ 70																										
75 < W ≤ 105	≥ 80	≥ 75																										
105 < W ≤ 155	≥ 80	≥ 75																										
155 < W ≤ 255	≥ 80	≥ 75																										
255 < W ≤ 405	≥ 85	≥ 75																										
	Metal halide lamps shall comply with energy efficiency requirements specified in table 17			N																								
Table 17	<table><tr><th>Nominal Lamp Wattage [W]</th><th>Rated Lamp Efficacy [Lm/W] - Clear Lamps</th><th>Rated Lamp Efficacy [Lm/W] - Not Clear Lamps</th></tr><tr><td>W ≤ 55</td><td>≥ 70</td><td>≥ 65</td></tr><tr><td>55 &lt; W ≤ 75</td><td>≥ 80</td><td>≥ 75</td></tr><tr><td>75 &lt; W ≤ 105</td><td>≥ 85</td><td>≥ 80</td></tr><tr><td>105 &lt; W ≤ 155</td><td>≥ 85</td><td>≥ 80</td></tr><tr><td>155 &lt; W ≤ 255</td><td>≥ 85</td><td>≥ 80</td></tr><tr><td>255 &lt; W ≤ 405</td><td>≥ 90</td><td>≥ 85</td></tr></table>	Nominal Lamp Wattage [W]	Rated Lamp Efficacy [Lm/W] - Clear Lamps	Rated Lamp Efficacy [Lm/W] - Not Clear Lamps	W ≤ 55	≥ 70	≥ 65	55 < W ≤ 75	≥ 80	≥ 75	75 < W ≤ 105	≥ 85	≥ 80	105 < W ≤ 155	≥ 85	≥ 80	155 < W ≤ 255	≥ 85	≥ 80	255 < W ≤ 405	≥ 90	≥ 85			N			
Nominal Lamp Wattage [W]	Rated Lamp Efficacy [Lm/W] - Clear Lamps	Rated Lamp Efficacy [Lm/W] - Not Clear Lamps																										
W ≤ 55	≥ 70	≥ 65																										
55 < W ≤ 75	≥ 80	≥ 75																										
75 < W ≤ 105	≥ 85	≥ 80																										
105 < W ≤ 155	≥ 85	≥ 80																										
155 < W ≤ 255	≥ 85	≥ 80																										
255 < W ≤ 405	≥ 90	≥ 85																										
	All other High Intensity Discharge lamps shall comply with energy efficiency requirements specified in table 18			N																								
Table 18	<table><tr><th>Nominal Lamp wattage [W]</th><th>Rated Lamp Efficacy [lm/W]</th></tr><tr><td>W ≤ 40</td><td>50</td></tr><tr><td>40 &lt; W ≤ 50</td><td>55</td></tr><tr><td>50 &lt; W ≤ 70</td><td>65</td></tr><tr><td>70 &lt; W ≤ 125</td><td>70</td></tr><tr><td>125 &lt; W</td><td>75</td></tr></table>	Nominal Lamp wattage [W]	Rated Lamp Efficacy [lm/W]	W ≤ 40	50	40 < W ≤ 50	55	50 < W ≤ 70	65	70 < W ≤ 125	70	125 < W	75			N												
Nominal Lamp wattage [W]	Rated Lamp Efficacy [lm/W]																											
W ≤ 40	50																											
40 < W ≤ 50	55																											
50 < W ≤ 70	65																											
70 < W ≤ 125	70																											
125 < W	75																											
	For efficiency of ballasts and control gears refer to SASO 2902/2018 ENERGY EFFICIENCY, FUNCTIONALITY AND LABELLING REQUIREMENTS FOR LIGHTING PRODUCTS (PART 2)			N																								
10.2	Functionality/Performance LEDs requirements			P																								

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SASO-2927:2019			
Clause	Requirement - Test	Result - Remark	Verdict
	The lighting unit shall be designed to operate continuously at external temperature and humidity, taking into account the effects of direct exposure to sunlight and dust storms.		P
	Life span of LED chips and Luminaire shall be greater than or equal to 70% (L70) after 50,000 hours		P
	Color rendering (Ra) $\geq 70$		P
	Color temperature must be between 3000 - 6000 K		P
	Vendor shall present ISTMT test results for the luminaire at 50°C which displays the recorded temp within each part of the luminaire (LED chips, Lenses, Driver, SPD)		P
	Colour consistency -5-step MacAdam ellipse or less.		P
	Maintenance factor = Lamp Lumen Depreciation for Led chips x Luminaire Dirt Depreciation (LDD)		P
<b>10.3</b>	<b>Electrical Requirements</b>		P
	The installation shall have overvoltage protection of 10 kV.		P
	All luminaires shall have Class I electrical protection.		P
	The control unit shall be equipped with internal protection to withstand charges and lightning of not less than 4 kV		P
	Constant Voltage Drivers are not allowed to be used; drivers shall be programmable whether DALI (preferable) or 0-10V dimmable		P
	Fixture shall include a base for Receptacle 7-pin NEMA Socket capped (shortcircuited) to enable future use in smart city application		P
	The control units (Driver) must operate with voltage (120-277) Vac at 60 Hz		P
	If the temperature exceeds the permissible limits, the control unit shall reduce the intensity of the lantern lighting gradually until the temperature returns to normal rates; it is not allowed to use control units that turn the lantern fully off when the temperature rises.		P
	For luminaires, the functionality and endurance requirements can be supported by a factory test report.		P
	The Power factor value for driver and integrated luminaire shall be $\geq 0.9$		P
	Total Harmonic Distortion of the driver individually $< 15\%$		P
<b>10.4</b>	<b>Mechanical Requirements</b>		P
	The luminaire / integrated luminaire units shall have IP66		P
	The control gear in the lighting fixtures shall have IP66 protection levels		P
	The luminaire shall have an impact protection rating greater than IK08		P
	The control unit enclosure shall be designed to withstand a temperature between -10 and +85.		P

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SASO-2927:2019			
Clause	Requirement - Test	Result - Remark	Verdict
	The painted parts of the lighting unit are exposed to the external environment and shall exceed the fifth classification after 2,500 hours		P
	The vibration test of roads and bridges (3 Axis vibration test) is performed in accordance with ANSI C136.31-2001, ANSI C136.3-2001. The test shall be in the case of road installation at least 1.5G and in the case of installation on bridges or tunnels at least 3G		P
	The luminaire shall be built in such a way that it can withstand wind speed of 150 KMph.		P
	The Surge Protection Device (SPD) shall be able to work normally at a temperature of 80°C (inside the fixture)		P
<b>10.5</b>	<b>Requirements</b>		P
	Lamps and integrated luminaires in the scope of this standard shall comply with the marking requirement according to SASO 2902/2018 ENERGY EFFICIENCY, FUNCTIONALITY AND LABELLING REQUIREMENTS FOR LIGHTING PRODUCTS (PART 2)		P
<b>10.6</b>	<b>Energy Efficiency Label</b>		P
<b>10.7</b>	<b>Hazardous Materials</b>		P
<b>10.8</b>	<b>Photobiological safety test</b>	<input checked="" type="checkbox"/> Exempt <input type="checkbox"/> Risk 1 <input type="checkbox"/> Risk 2 <input type="checkbox"/> Risk 3	P
<b>11</b>	<b>Registration requirements</b>		P
<b>5.1</b>	<b>General</b>		P
	<ul style="list-style-type: none"><li>• datasheets for the Fixture</li><li>• datasheets for the Driver</li><li>• datasheets for the LED units</li><li>• datasheets for the SPD</li><li>• LM-79-08 test report accredit</li><li>• LM - 80 -08 and TM - 21 - 11 reports</li><li>• LM - 82 - 12 report</li><li>• LM – 84-14 and TM – 28-14 reports at temperature (50°C) at 2000 hr. or 6000 hr.</li><li>• ISTMT test for the luminaire at 50°C which displays the recorded temp within each part of the luminary (LED chips, Driver)</li><li>• IP test according to IEC/EN 60598 -1</li><li>• IK test according to IEC/EN 62262</li><li>• THD test according to IEC 610000-3-2</li><li>• Corrosion test according to ISO 9227 for 2500 hours and should obtain Class 5 or above</li><li>• 3-axis vibration test according to ANSI C136.3-2001, ANSI C136.31-2001 Minimum 1.5G for road and 3G for bridges and tunnels</li><li>• Photobiological safety test</li></ul>		P





SASO-2902:2018																														
Clause	Requirement - Test	Result - Remark	Verdict																											
Annex C	Energy efficiency requirements for non-direction lamps		--																											
C1	Indirect lamps, comply with the Annex C according to Table 5		N																											
	The useful luminous flux (Φ <sub>use</sub> ) is defined in accordance with Table 4		N																											
	Corrected Power (P <sub>cor</sub> )		N																											
	Reference Power (P <sub>ref</sub> ) Φ < 1300 lm (P <sub>ref</sub> = 0,88 √ Φ + 0,049 Φ ) Φ ≥ 1300 lm (P <sub>ref</sub> = 0,07341 Φ )		N																											
C2	Maximum Energy Efficiency Index (EEI) within the limit according to table 5 <b>Table 5: Maximum Energy Efficiency Index (EEI)</b> <table><tr><th rowspan="2">Lamps types</th><th colspan="4">Date of enforcement : 6 months after publication in the Official Gazette</th></tr><tr><th>CFLni</th><th>LFL Other fluorescent</th><th>LED</th><th>High Intensity Discharge (HID)</th></tr><tr><td>Maximum Values</td><td>0.24</td><td>0.24</td><td>0.24</td><td>0.50</td></tr></table>	Lamps types	Date of enforcement : 6 months after publication in the Official Gazette				CFLni	LFL Other fluorescent	LED	High Intensity Discharge (HID)	Maximum Values	0.24	0.24	0.24	0.50		N													
Lamps types	Date of enforcement : 6 months after publication in the Official Gazette																													
	CFLni	LFL Other fluorescent	LED	High Intensity Discharge (HID)																										
Maximum Values	0.24	0.24	0.24	0.50																										
C3	Energy efficiency classes for non - directional lamps according to table 6 <b>Table 6: Energy efficiency classes for non-directional lamps</b> <table><tr><th>Energy efficiency index (EEI)</th><th>Energy efficiency class (Arabic)</th><th>Equivalent energy efficiency class (English)</th></tr><tr><td>EEI ≤ 0.11</td><td>أ</td><td>A</td></tr><tr><td>0.11 &lt; EEI ≤ 0.13</td><td>ب</td><td>B</td></tr><tr><td>0.13 &lt; EEI ≤ 0.18</td><td>ج</td><td>C</td></tr><tr><td>0.18 &lt; EEI ≤ 0.24</td><td>د</td><td>D</td></tr><tr><td>0.24 &lt; EEI ≤ 0.50</td><td>هـ</td><td>E</td></tr><tr><td>0.50 &lt; EEI ≤ 0.95</td><td>و</td><td>F</td></tr><tr><td>0.95 &lt; EEI ≤ 1.75</td><td>ز</td><td>G</td></tr><tr><td colspan="3">Note: For labelling purposes, the Arabic letters shall be used. The equivalent English version is only provided for informational purposes</td></tr></table>	Energy efficiency index (EEI)	Energy efficiency class (Arabic)	Equivalent energy efficiency class (English)	EEI ≤ 0.11	أ	A	0.11 < EEI ≤ 0.13	ب	B	0.13 < EEI ≤ 0.18	ج	C	0.18 < EEI ≤ 0.24	د	D	0.24 < EEI ≤ 0.50	هـ	E	0.50 < EEI ≤ 0.95	و	F	0.95 < EEI ≤ 1.75	ز	G	Note: For labelling purposes, the Arabic letters shall be used. The equivalent English version is only provided for informational purposes				N
Energy efficiency index (EEI)	Energy efficiency class (Arabic)	Equivalent energy efficiency class (English)																												
EEI ≤ 0.11	أ	A																												
0.11 < EEI ≤ 0.13	ب	B																												
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0.50 < EEI ≤ 0.95	و	F																												
0.95 < EEI ≤ 1.75	ز	G																												
Note: For labelling purposes, the Arabic letters shall be used. The equivalent English version is only provided for informational purposes																														
C4	Annual energy consumption(kWh/yr)		N																											
Annex D	Functionality and endurance requirements for non-directional lamps and luminaires		N																											
D1	Functionality and endurance requirements for non - directional fluorescent lamps		N																											
Table 7	Lamp lumen maintenance: factors for without integrated ballast single and double capped fluorescent lamps		N																											
Table 8	Lamp lumen maintenance - Deduction percentages for fluorescent lamp lumen maintenance requirements		N																											
Table 9	Lamp survival factors for single and double capped fluorescent lamps		N																											
Table 10	Functionality and endurance requirements for non-directional compact fluorescent lamps operated on external control gear (CFLni)		N																											
	Lamp survival factor: Limit: ≥ 0.70 (at 6000h)		N																											



SASO-2902:2018			
Clause	Requirement - Test	Result - Remark	Verdict
	Lumen maintenance at 2000h: Limit: $\geq 83\%$		N
	Lumen maintenance at 6000h: Limit: $\geq 70\%$		N
	Lamp warm-up time to 60% $\Phi$ : Limit: $< 40s$ , or		N
	Lamp warm-up time to 60% $\Phi$ : Limit: $< 100s$ (for lamps containing mercury in amalgam form)		N
	Premature failure rate: Limit: $\leq 5.0\%$ ( at 1000h)		N
	Color rendering ( $R_a$ ) $\geq 80$		N
	Color rendering ( $R_a$ ) if the lamp is intended for outdoor or industrial applications		N
D2	Functionality and endurance requirements for metal halide lamps and Highpressure sodium		N
Table 11	$P \leq 75$ W LLMF and LSF measured at 12,000 burning hours		N
	$P > 75$ W LLMF and LSF measured at 16,000 burning hours		N
Table 12	Functionality and endurance requirements for metal halide lamps		N
D3	Functionality and endurance requirements for non - directional LED lamps and luminaires		N
Table 13	Lamp survival factor at 6000 hours: Limit 0.9		N
	Lumen maintenance at 6000 hours: Limit: 0.8		N
	Number of switching cycles before failure: half the lamp lifetime expressed in hours		N
	Number of switching cycles before failure: 15000 if lamp rated life 30000h		N
	Starting time: Limit: $< 0.5s$		N
	Lamp warm-up time ( $t_{Warm}$ ) to 95 % $\Phi$ , Limit: $< 2 s$		N
	Premature failure rate: Limit: 5.0% (at 1000h)		N
	Color rendering ( $R_a$ ): Limit: $\geq 80$		N
	Color rendering ( $R_a$ ) $\geq 65$ if the lamp is intended for outdoor or industrial applications		N
	Colour consistency -Six-step MacAdam ellipse or less.		N
	Lamp displacement factor: $P \leq 2W$ : no requirement		N
	Lamp displacement factor: Limit: $\geq 0.4$ for $2W < P \leq 5W$		N
	Lamp displacement factor: Limit: $\geq 0.7$ for $5W < P \leq 25W$		N
	Lamp displacement factor: Limit: $\geq 0.9$ for $P > 25W$		N

Annex E	Energy efficiency requirements for direction lamps		--
E1	Direction lamps, comply with the Annex E according to Table 17		N
	Corrected Power ( $P_{cor}$ ), without external control gear		N
Table 14	Corrected Power ( $P_{cor}$ ), Power Correction if the model requires external control gear		N
Table 15	Definition of useful luminous flux		N

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Clause	Requirement - Test	Result - Remark	Verdict
	Directional lamps with a beam angle $\geq 90^\circ$ other than filament lamps and carrying a warning on their packaging that they are not suitable for accent lighting: Rated luminous flux in a $120^\circ$ cone ( $\Phi 120^\circ$ )		N
	Other directional lamps: rated luminous flux in a $90^\circ$ cone ( $\Phi 90^\circ$ )		N
	Reference Power (Pref) $\Phi < 1300 \text{ lm}$ (Pref= $0,88 \sqrt{\Phi + 0,049 \Phi}$ ) $\Phi \geq 1300 \text{ lm}$ (Pref= $0,07341 \Phi$ )		N
E2	Maximum Energy Efficiency Index (EEI) within the limit according to table 16		N
E3	Energy efficiency classes according to table 17		N
E4	Annual energy consumption		N

Annex F	Functionality requirements for directional lamps and integrated luminaires		--
Table 18	Functionality and endurance requirements for directional LED lamps and integrated luminaires		P
	Lamp survival factor at 6000 hours: Limit $\geq 0.9$	100%	P
	Lumen maintenance at 6000 hours: Limit: $\geq 0.8$	91.41%	P
	Number of switching cycles before failure: $\geq$ half the lamp lifetime expressed in hours		N
	Number of switching cycles before failure: $\geq 15000$ if lamp rated life $\geq 30000\text{h}$	15000	P
	Starting time: Limit: $< 0.5\text{s}$	0.214	P
	Premature failure rate: Limit: $\leq 5.0\%$ (at 1000h)	0	P
	Color rendering (Ra): Limit: $\geq 80$		N
	Color rendering (Ra) if the lamp is intended for outdoor or industrial applications	82.9	P
	Colour consistency -Six-step MacAdam ellipse or less.	2.6	P
	Lamp displacement factor: P 2W: no requirement		N
	Lamp displacement factor: Limit: $>0.4$ for $2\text{W} < \text{P}5\text{W}$		N
	Lamp displacement factor: Limit: $>0.7$ for $5\text{W} < \text{P}25\text{W}$		N
	Lamp displacement factor: Limit: $> 0.9$ for Power $>25\text{W}$	0.996	P

Annex G	Marking requirements for non-directional and directional lamps		--
G1	For lamps other than high-intensity discharge lamps, the following shall be printed on the bulb with non-removable ink:		P
	Brand name		P
	Input voltage		P
	Nominal power		P
	Country of origin		P

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Clause	Requirement - Test	Result - Remark	Verdict
G2	Information to be visibly displayed to end - users, prior to their purchase, on the packaging and on free access websites		P
	The information in paragraphs (a) to (y) below shall be displayed on free-access websites and in any other form the manufacturer deems appropriate.		P
	The information in paragraphs (a) to (p) below shall be visibly displayed on the packaging if the product is intended to be displayed to the end-users.		P
	The information does not need to use the exact wording on the list below. It may be displayed in the form of graphs, drawings or symbols rather than text.		P
	Brand name		P
	Model number		P
	Input voltage		P
	Country of origin		P
	Lamp type (indirect)		P
	Country of origin		P
	Rated voltage and rated frequency		P
	Rated useful luminous flux		P
	Efficacy (lumen/Watt)		P
	Rated power		P
	Rated beam angle in degrees (only for directional lamps)		P
	Lamp displacement factor (only for LED lamps with integrated control gear)		P
	Rated life time of the lamp in hours		P
	Rated Color temperature, as a value in Kelvins, expressed graphically or in words		P
	Number of switching cycles before premature failure (only for LED lamps or if claimed by the manufacturer for other type of lamps)		P
	Color rendering index (Ra)		P
	Stating all hazardous material contained in the lamp/luminaire, as relevant		P
	Statement referring to a Website		N
	- on how to clean lamp debris in case of accidental lamp breakage and disposal of lamp at the end of life, when relevant;		N
	- About actual values of the hazardous content, when relevant		N
	A warning if the lamp cannot be dimmed or can be dimmed only on specific dimmers; in the latter case, a list of compatible dimmers shall be also provided on the manufacturer's website		N
	Following information are optional:		N
	Lamp type: directional or non-directional		N

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Clause	Requirement - Test	Result - Remark	Verdict
	Color consistency (only for LED lamps)		N
	Lumen maintenance factor at the end of the nominal life		N
	Warm-up time up to 60 % of the full light output (may be indicated as 'instant full light' if less than 1second), when relevant		N
	If designed for optimum use in non-standard conditions (such as ambient temperature $T_a \neq 25^\circ\text{C}$ or specific thermal management is necessary), provide information on those conditions		N
	Rated peak intensity in candela (cd), when available		N
	An equivalence claim involving the power of a replaced lamp type may be displayed only if the lamp type is listed in Part 1 - Table 13.		N
	For LED lamps, if intended for use in outdoor or industrial applications, an indication to this effect		N
	Lamp dimensions in millimeters (length and largest diameter)		N
	Actual values of all hazardous material contained in the lamp/luminaire		N

Annex H	Requirement on ballast for fluorescent lamps without integrated ballast and ballast for high intensity discharge, halogen and LED lamps		--
H1	Ballast energy performance requirements		N
H1.1	Ballast for all types of lamps		N
	The no-load power of a lamp control gear intended for use between the mains and the switch for turning the lamp load on/off shall not exceed 1.00W.		N
	For lamp control gear with output power (P) over 250 W, the no-load power limits shall be multiplied by $P/250\text{ W}$ .		N
	The standby power of a lamp control gear shall not exceed 1.00 W.		N
H1.2	Additional requirement for control gear for halogen and LED lamps		N
	The efficiency of control gear shall be at least 0,91 at 100 % load.		N
H1.3	Additional requirement for ballasts for high intensity discharge lamps		N
Table 19	Minimum efficiency for ballasts for high intensity discharge lamps		N
H1.4	Additional requirement for ballasts for fluorescent lamps		N
Table 20	The minimum energy efficiency index class shall be B2 for ballasts covered by table 20		N
	A3 for the ballasts covered by table 21		N
	A1 for dimmable ballasts covered by table 22		N
	At the dimming position corresponding to 25 % of the lumen output of the operated lamp, the input power ( $P_{in}$ ) of the lamp-ballast circuit shall not exceed:		N

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Clause	Requirement - Test	Result - Remark	Verdict
	$P_{in} < 50 \% P_{Lrated}/\eta_{ballast}$		
	The power consumption of the fluorescent lamp ballasts shall not exceed 100 W		N
Table 21	Energy efficiency index requirements for non-dimmable ballasts for fluorescent lamps not included in Table 20		N
Table 22	Energy efficiency index requirements for dimmable ballasts for fluorescent lamps		N
H2	Product information requirements on ballasts		N
	Manufacturers of ballasts shall provide at least the following information on free-access websites and in other forms they deem appropriate for each of their ballast models.		N
	For ballasts for fluorescents lamps, an energy efficiency index (EEI) class shall be provided		N
	The classes for nondimmable ballasts are (in descending order of efficiency) A2 BAT, A2, A3, B1, B2		N
	For dimmable ballasts A1 BAT and A1.		N

Annex I	Energy label for lamps and integrated luminaires		--
I1	Determining the energy efficiency class		P
	The energy efficiency class for each product shall be determined as outlined in Table 6 in Annex C (non-directional lamps)		P
	as outlined in Table 15 in Annex E (directional lamps) or in Table 37 in Annex M for integrated luminaires.		P
I2	Design and placement of the label		P
	The label shall be printed directly on the packaging of the product.		P
	The size of the label shall comply with figure 1 (43 mm wide and 75 mm high)		P
	if the size of the packaging does not fit with the dimension of Label in figure 1, then design and dimension of Label shall match with Label as presented in figure 2 (43 mm wide and 45 mm high).		P
	If the packaging is too small to take the label according figure 2, the label complying with figure 1 shall be printed on the outer packaging.		P
I3	Information and values contained on the label		P

Annex J	Hazardous chemicals: Substance restrictions for lamps & control gears		--
Table 24	Maximum content limits of hazardous substances		P
Table 25	Lamps exempted from exemptions listed in Table 22		P
Table 26	Maximum mercury content		P

Annex K	Tests methods for lamps and control gears		--
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Clause	Requirement - Test	Result - Remark	Verdict

Annex L	Measurement of the mercury content for fluorescent lamps	--
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Annex M	Energy efficiency for (integrated) luminaires		--		
M1	Types of luminaires, table 34		P		
M2	Minimum Efficacy for luminaires, table 35		P		
	Prated < 15W, ≥ 65 Lumen/Watt		N		
	Prated ≥ 15W, ≥ 70 Lumen/Watt		P		
M3	Energy Efficiency Index for luminaires (EEI)		P		
	Corrected Power (Pcor),without external control gear		N		
	Corrected Power (Pcor), with external control gear		P		
Table 36	P rated ≤ 6W, Pcor = Prated x 1.17		N		
	6 W < P rated ≤ 15 W, Pcor = Prated x 1.03		N		
	15 W < P rated, Pcor = Prated x 0.98	Pcor = 200.48 x 0.98=196.47W	P		
	Useful luminous flux	29701.87	P		
	Reference Power (Pref) Φ < 1300 lm (Pref= 0,88√ Φ + 0,049 Φ ) Φ ≥ 1300 lm (Pref= 0,07341 Φ )	2180.41	P		
M4	Classification of Energy Efficiency Index for (integrated) luminaires (EEI)	0.090	P		
Table 37	Energy efficiency classes for luminaires <i>Table 37: Energy efficiency classes for luminaires</i>		A	P	
	Energy efficiency index (EEI)	Energy efficiency class (Arabic)			Equivalent energy efficiency class (English)
	EEI ≤ 0.11	أ			A
	0.11 < EEI ≤ 0.13	ب			B
	0.13 < EEI ≤ 0.18	ج			C
	0.18 < EEI ≤ 0.24	د			D
	0.24 < EEI ≤ 0.50	هـ			E
	0.50 < EEI ≤ 0.95	و			F
	0.95 < EEI ≤ 1.75	ز			G
	Note: For labelling purposes, the Arabic letters shall be used. The equivalent English version is only provided for informational purposes				



**Appendix-Test Data Sheet****Functionality requirements for directional lamps and integrated luminaires:****Annex F, Table 18 for direct LED lamps and luminaires**

Test Voltage (V):			120V			Frequency(Hz):			60					
Sample No.	Starting time (s)	Switching Cycle	Premature Failure Rate 1000h	Power (W)	Power Factor	Luminous Flux $\Phi_{use}$ (lm)	Efficacy (lm/W)	Beam angle (°)	Color Temp (CCT)	Color rendering (Ra)	SDCM	Luminous flux (lm) After 6000h	Lumen Maintenance at 6000h (%)	Survival factor at 6000h
1	0.216	15000	P	200.69	0.998	29732.00	148.15	111.1	3960	82.9	2.3	27100.72	91.15%	P
2	0.205	15000	P	200.27	0.995	29653.18	148.07	110.8	3954	83.3	2.8	27091.15	91.36%	P
3	0.211	15000	P	200.90	0.998	29821.16	148.44	110.9	3967	82.4	2.1	27378.81	91.81%	P
4	0.208	15000	P	200.34	0.999	29663.80	148.07	111.6	3933	83.0	2.5	27008.89	91.05%	P
5	0.220	15000	P	200.19	0.994	29634.51	148.03	111.2	3980	83.1	2.9	27162.99	91.66%	P
6	0.215	15000	P	200.86	0.993	29821.75	148.47	110.8	3927	82.8	2.0	27277.95	91.47%	P
7	0.200	15000	P	200.54	0.997	29700.36	148.10	111.3	3946	82.6	3.3	27258.99	91.78%	P
8	0.214	15000	P	200.13	0.992	29600.37	147.91	111.4	3992	83.2	2.4	27010.34	91.25%	P
9	0.218	15000	P	200.09	0.998	29587.69	147.87	111.0	3967	82.8	2.8	26924.80	91.00%	P
10	0.229	15000	P	200.79	0.996	29803.91	148.43	110.7	3972	82.7	2.5	27297.40	91.59%	P
Avg.	0.214	15000	P	200.48	0.996	29701.87	148.15	111.1	3960	82.9	2.6	27151.20	91.41%	P

Test Voltage (V):		277V			Frequency(Hz):		60				
SampleNo.	1	2	3	4	5	6	7	8	9	10	Avg.
Power (W)	196.20	196.81	196.34	196.08	196.66	196.72	196.27	196.09	196.37	196.28	196.38
Luminous Flux $\Phi_{use}$ (lm)	28255.13	28416.09	28298.8	28204.710	28364.78	28399.97	28301.48	28214.79	28321.03	28300.51	28307.73

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**ATTACHMENT 1(S)**

Photos of AOK-200WiL02-NV-L3-00-40



**Revision History**

Revision	Issue Date	Revision Content	Revised By
V1.1	2021/09/03	Modify the Client、Manufacturer、Model and Trademark	Seth Cai

**Remark:** This report is based on the report No. LCS200722065BS. This report is invalid without the original report.

----- End of test report-----

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