

# Report of Test LL18060

Product ID: Hawko ES-Surface c/w superFLEX 15w/mtr LED Strip 4000K.

Hawko Lighting Group Australia. Silver finish extruded aluminium housing and grey plastic endcaps, extent ~ 524 x 18 x 16 mm deep. Frosted "Ice" diffuser forms luminous opening of 520 x 16 x 1 mm deep.

Five Hawko 24V LED strip sections with total of 35 "Samsung" LEDs centred 12 mm above L/O.

Remote KSAS0252400125HA 100-240V~ 50/60Hz AC adaptor.

Tested at 240 V 50 Hz.

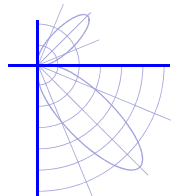


## Performance Summary

Luminous flux	479 lm
Luminaire Power	7.57 W
Luminous Efficacy	63.3 lm/W
SHR Nominal	1.00
SHR Maximum	1.14

**PREPARED FOR : Hawko Lighting Group Australia Pty. Ltd., Caloundra. QLD. 4551.**





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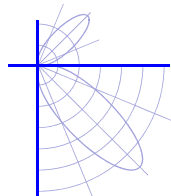
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### LM-79 Performance Data

Spectral	CIE 1931 (x, y) <sup>(1)</sup>	(0.379, 0.380)
	CIE 1976 (u', v') <sup>(1)</sup>	(0.223, 0.503)
	Correlated Colour Temperature (CCT) <sup>(1)</sup>	4060 K
	Colour Spatial Uniformity <sup>(2)</sup>	0.0017
	Colour Rendering Index (Ra) <sup>(1)</sup>	84
	Special CRI 9 (R <sub>g</sub> ) <sup>(1),(3)</sup>	19
	Distance from Planckian Locus (Duv) <sup>(1),(3)</sup>	0.0020
	Scotopic/Photopic Ratio <sup>(1),(3)</sup>	1.71

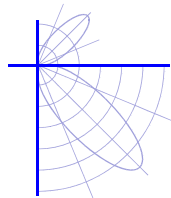
Electrical	Voltage	240 V
	Frequency	50 Hz
	Current	0.081 A
	Power	7.57 W
	Power Factor	0.39
	Current THD	234.0 %

Performance data in accordance with IESNA LM-79-08. Spectral calculations are for a CIE 2° observer

(1) Value is computed from the weighted average of the spatial measurements

(2) Value is the maximum deviation of the spatial u' and v' measurements from the weighted average

(3) Quantity is in addition to the scope of IESNA LM-79-08



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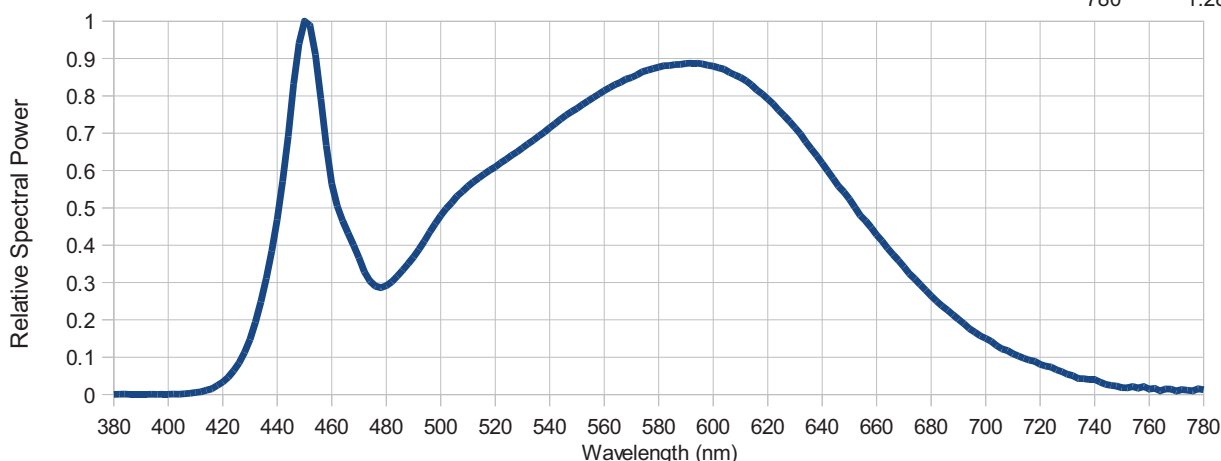
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### LM-79 Performance Data

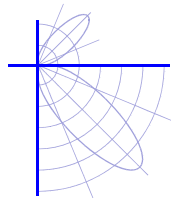
#### Summary Relative Spectral Irradiance Distribution (wavelength – nm, irradiance – relative to peak = 1)

380	2.88E-04	480	2.91E-01	580	8.77E-01	680	2.64E-01
385	8.67E-04	485	3.25E-01	585	8.83E-01	685	2.32E-01
390	4.18E-04	490	3.68E-01	590	8.87E-01	690	2.02E-01
395	5.51E-04	495	4.23E-01	595	8.87E-01	695	1.72E-01
400	9.60E-04	500	4.79E-01	600	8.79E-01	700	1.51E-01
405	1.49E-03	505	5.22E-01	605	8.67E-01	705	1.27E-01
410	5.44E-03	510	5.58E-01	610	8.50E-01	710	1.09E-01
415	1.34E-02	515	5.85E-01	615	8.23E-01	715	9.47E-02
420	3.33E-02	520	6.10E-01	620	7.92E-01	720	8.09E-02
425	7.43E-02	525	6.35E-01	625	7.54E-01	725	7.02E-02
430	1.47E-01	530	6.61E-01	630	7.15E-01	730	5.46E-02
435	2.80E-01	535	6.86E-01	635	6.67E-01	735	4.25E-02
440	4.68E-01	540	7.14E-01	640	6.20E-01	740	4.02E-02
445	7.62E-01	545	7.43E-01	645	5.68E-01	745	2.60E-02
450	1.00E+00	550	7.67E-01	650	5.24E-01	750	1.84E-02
455	8.52E-01	555	7.91E-01	655	4.72E-01	755	1.94E-02
460	5.65E-01	560	8.14E-01	660	4.28E-01	760	1.48E-02
465	4.49E-01	565	8.33E-01	665	3.83E-01	765	1.24E-02
470	3.66E-01	570	8.49E-01	670	3.42E-01	770	9.50E-03
475	2.97E-01	575	8.67E-01	675	3.02E-01	775	1.07E-02
						780	1.28E-02



\* The spectral power distribution combines the weighted spectral power distributions of all spatial measurements.





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Tested at 240 V 50 Hz.

### LM-79 Performance Data

#### Spatial measurements

Gamma angle (deg)	CIE 1976 (u',v') coordinates	
	C 0 plane	C 90 plane
0	(0.222, 0.502)	(0.223, 0.502)
10	(0.223, 0.502)	(0.223, 0.502)
20	(0.223, 0.502)	(0.223, 0.502)
30	(0.222, 0.502)	(0.223, 0.503)
40	(0.222, 0.502)	(0.223, 0.503)
50	(0.223, 0.503)	(0.224, 0.504)
60	(0.223, 0.504)	(0.224, 0.504)
70	(0.222, 0.502)	(0.223, 0.504)
80	I <= 10 %	I <= 10 %
-	-	-

#### Spatial measurements

Gamma angle (deg)	CIE 1976 (u',v') coordinates	
	C 0 plane	C 90 plane
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

#### Test procedure

All measurements were performed in an environmentally controlled laboratory employing suitable baffling to minimise stray light. The sample was mounted in its normal operating orientation on a rotating mirror goniophotometer and operated from a stabilised supply. The photometric output was monitored and measurements were performed once stability was achieved.

The goniophotometer was used to measure the spatial distribution of both luminous intensity and, in conjunction with a spectroradiometer and spectrally flat reflectance tile, spectral irradiance. The distribution locus comprises points in two or more C planes at no more than 10° gamma intervals. The CIE (x,y) coordinates and other derived metrics (CIE (u', v'), CCT and CRI) are calculated from the weighted sum (weighted for intensity and represented solid angle) of the measured spectral irradiances.

Sample Orientation	Ceiling mount	Stabilisation Time	18.75 hour
		Total Operation Time	20 hour

#### Equipment and uncertainties

C-gamma rotating mirror goniophotometer with a test distance of 8 m.

Luminous Intensity	± 4 %	Temperature	± 1 °C
Luminous Flux	± 4 %	Luminous Efficacy	± 4.5 %
C, Gamma Angles	± 0.5°		

PhotoResearch PR-670 spectroradiometer (380 - 780 nm., 2 nm. per pixel) measuring from a spectrally flat reflectance tile attached to goniophotometer arm at a distance from sample deemed >5 times the maximum observed luminous opening dimension.

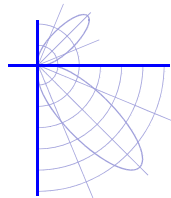
CIE (x, y) coordinates	± 0.004	CCT	± 150 K
CIE (u', v') coordinates	± 0.0025	CRI (Ra)	± 2
Δ (u', v') Colour difference	± 0.001	Scotopic / Photopic Ratio *	± 0.02
Relative Spectral Irradiance *	± 2 %	R9 *	± 2

Yokogawa WT210 power meter connected in circuit to the sample electrical supply

Voltage	± 0.5 %	Frequency *	± 0.1 Hz
Current	± 0.5 %	Power	± 0.5 %
Current THD *	± 3 %	Power Factor	± 0.02

Quantities marked with \* : NATA accreditation does not cover the performance of this service.

IESNA LM-79-08 Calculator v4.9 (23rd Sep 2014)



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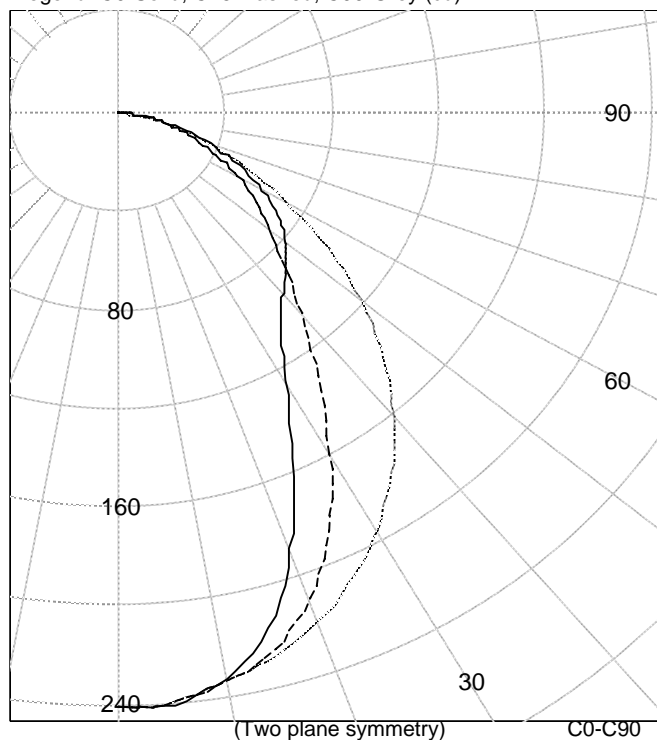
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Tested at 240 V 50 Hz.

Legend: C0-Solid, C45-Dashed, C90-Grey (cd)



### AVERAGE LUMINANCE (cd / sq.m)

Gamma	C0	C45	C90
45.0	14226	14417	24005
55.0	14040	12414	20204
65.0	12616	10530	15411
75.0	9085	8444	10504
85.0	6505	6595	5014

### INTENSITY SUMMARY (cd)

Gamma	C-Plane					Flux (lm)
	C0	C22.5	C45	C67.5	C90	
0.0	241	241	241	241	241	23
5.0	240	240	240	240	240	
10.0	234	234	235	236	235	
15.0	218	220	226	230	229	63
20.0	189	196	210	220	220	85
25.0	155	164	187	207	208	
30.0	126	133	159	190	195	
35.0	107	110	131	170	179	87
40.0	96	96	107	146	161	79
45.0	89	86	89	121	141	
50.0	82	78	75	97	120	
55.0	73	69	63	75	96	65
60.0	63	59	52	56	74	45
65.0	50	48	41	41	54	
70.0	36	37	30	29	36	
75.0	24	26	21	19	23	24
80.0	15	16	13	10	11	7
85.0	8	9	7	4	4	
90.0	4	4	3	0	0	

### ZONAL FLUX AND PERCENTAGES

Zone	Flux (lm)	% Lamp	% Luminaire
0-30	171	N / A	35.6
0-40	257	N / A	53.7
0-60	402	N / A	83.9
0-90	478	N / A	99.8
40-90	221	N / A	46.1
60-90	76	N / A	15.9
90-180	1	N / A	0.2
0-180	479	N / A	100.0

Light Output Ratio = N / A

SHR-NOM = 1.00

SHR-MAX = 1.14

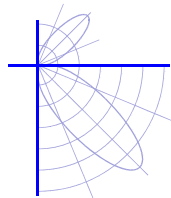
Calculated using the TM5  
fine grid method.

CERTIFIED BY:

Kevin Monaghan  
Authorised Signatory

Date of test  
Date of report

14-Oct-2014  
27-Oct-2014



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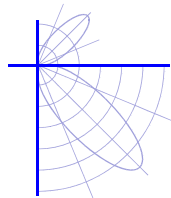
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Intensity data (cd)					
Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
0.0	241	241	241	241	241
2.5	241	241	241	241	241
5.0	240	240	240	240	240
7.5	238	238	238	238	238
10.0	234	234	235	236	235
12.5	227	229	231	233	232
15.0	218	220	226	230	229
17.5	205	210	219	225	225
20.0	189	196	210	220	220
22.5	173	180	200	214	215
25.0	155	164	187	207	208
27.5	139	148	174	199	202
30.0	126	133	159	190	195
32.5	114	120	144	180	188
35.0	107	110	131	170	179
37.5	100	102	118	159	171
40.0	96	96	107	146	161
42.5	92	91	97	134	151
45.0	89	86	89	121	141
47.5	85	82	81	109	130
50.0	82	78	75	97	120
52.5	78	74	69	86	108
55.0	73	69	63	75	96
57.5	68	64	57	66	85
60.0	63	59	52	56	74
62.5	57	53	46	49	64
65.0	50	48	41	41	54
67.5	43	42	35	35	45
70.0	36	37	30	29	36
72.5	30	31	26	24	29
75.0	24	26	21	19	23
77.5	19	20	17	14	16
80.0	15	16	13	10	11
82.5	11	12	10	7	7
85.0	8	9	7	4	4
87.5	6	6	5	2	1
90.0	4	4	3	0	0



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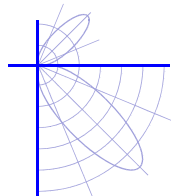
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Intensity data (cd)					
Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
90.0	4	4	3	0	0
92.5	2	2	1	0	0
95.0	1	1	0	0	0
97.5	0	0	0	0	0
100.0	0	0	0	0	0
102.5	0	0	0	0	0
105.0	0	0	0	0	0
107.5	0	0	0	0	0
110.0	0	0	0	0	0
112.5	0	0	0	0	0
115.0	0	0	0	0	0
117.5	0	0	0	0	0
120.0	0	0	0	0	0
122.5	0	0	0	0	0
125.0	0	0	0	0	0
127.5	0	0	0	0	0
130.0	0	0	0	0	0
132.5	0	0	0	0	0
135.0	0	0	0	0	0
137.5	0	0	0	0	0
140.0	0	0	0	0	0
142.5	0	0	0	0	0
145.0	0	0	0	0	0
147.5	0	0	0	0	0
150.0	0	0	0	0	0
152.5	0	0	0	0	0
155.0	0	0	0	0	0
157.5	0	0	0	0	0
160.0	0	0	0	0	0
162.5	0	0	0	0	0
165.0	0	0	0	0	0
167.5	0	0	0	0	0
170.0	0	0	0	0	0
172.5	0	0	0	0	0
175.0	0	0	0	0	0
177.5	0	0	0	0	0
180.0	0	0	0	0	0





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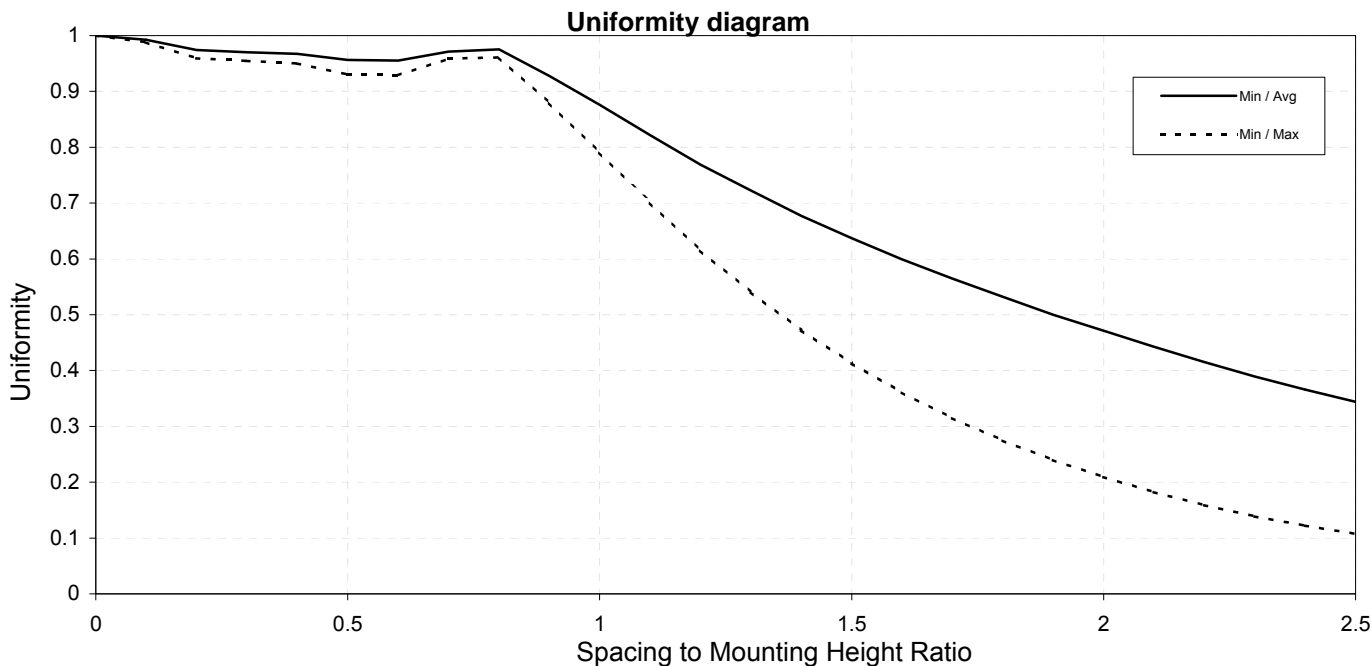
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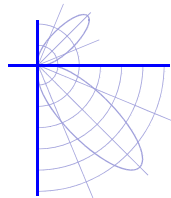
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**Test Distance:** 8.0 metres

**Test Temperature:** 25.0 degrees Celsius

**Significance:** This laboratory has no control over the selection of samples to be tested. All testing is performed on the understanding that the significance of the report is limited to the extent that the test sample is representative of production units.

**Special Notes:** The intensity values contained in this report are shown as tested. When using these values in calculations the appropriate Ballast Factor and Manufacturer's rated lumens MUST be taken into account.

It should also be noted that prorating the lumen output for the use of other lamp/ballast combinations, or for use in different environmental conditions, than that tested may produce erroneous results.

The generic term "LOR" is used in this report, it denotes the "Light Output Ratio Luminaire" as defined in Australian Standard AS1680, Part 3, 1991, Section 1.3.9.

This report is free of erasures and corrections.

Photometric intensity values are reported using the CIE Cgamma coordinate system as described in CIE Publication number 121.

**Uncertainties:** At the 95% confidence interval with a factor  $k = 2$ , the uncertainties for this report are :-

Temperature +/- 1 degree Celsius

Light Output Ratio +/- 4%

Luminous Intensity +/- 4%

Angular displacement +/- 0.5 degrees.

**Testing Procedure:** Tested in accordance with the applicable sections of CIE Publication Number 121; and with reference to Australian Standard AS1680, Part 3, 1991.