

Report of Test LL18061

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. Clear plastic 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.

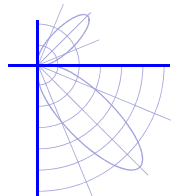


Performance Summary

Luminous flux	499 lm
Luminaire Power	7.58 W
Luminous Efficacy	65.9 lm/W
SHR Nominal	0.75
SHR Maximum	0.95

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





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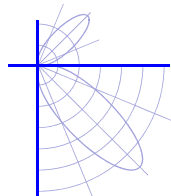
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LM-79 Performance Data

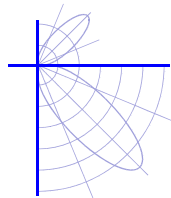
Spectral	CIE 1931 (x, y) ⁽¹⁾	(0.385, 0.386)
	CIE 1976 (u', v') ⁽¹⁾	(0.225, 0.507)
	Correlated Colour Temperature (CCT) ⁽¹⁾	3940 K
	Colour Spatial Uniformity ⁽²⁾	0.0088
	Colour Rendering Index (Ra) ⁽¹⁾	83
	Special CRI 9 (R _g) ^{(1),(3)}	15
	Distance from Planckian Locus (Duv) ^{(1),(3)}	0.0030
	Scotopic/Photopic Ratio ^{(1),(3)}	1.66
Electrical	Voltage	240 V
	Frequency	50 Hz
	Current	0.081 A
	Power	7.6 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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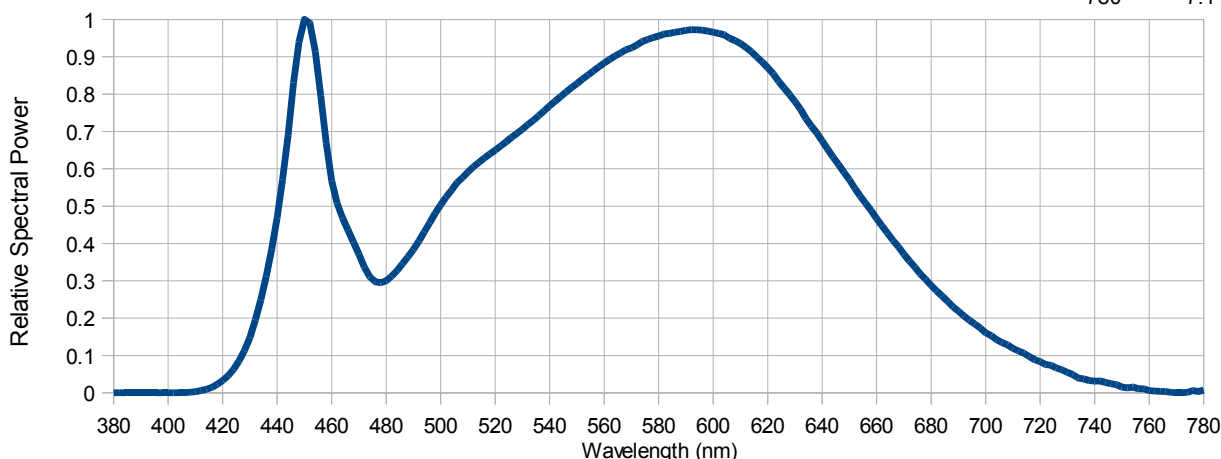
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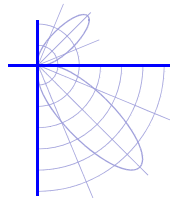
LM-79 Performance Data

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

380	0.00E+00	480	3.00E-01	580	9.56E-01	680	2.87E-01
385	5.97E-05	485	3.37E-01	585	9.64E-01	685	2.52E-01
390	1.79E-04	490	3.84E-01	590	9.71E-01	690	2.19E-01
395	6.10E-05	495	4.43E-01	595	9.72E-01	695	1.89E-01
400	3.72E-04	500	5.03E-01	600	9.66E-01	700	1.61E-01
405	3.99E-04	505	5.53E-01	605	9.54E-01	705	1.39E-01
410	2.89E-03	510	5.91E-01	610	9.36E-01	710	1.19E-01
415	1.21E-02	515	6.23E-01	615	9.07E-01	715	1.02E-01
420	3.29E-02	520	6.50E-01	620	8.71E-01	720	8.38E-02
425	7.41E-02	525	6.78E-01	625	8.25E-01	725	7.02E-02
430	1.48E-01	530	7.06E-01	630	7.80E-01	730	5.51E-02
435	2.80E-01	535	7.36E-01	635	7.25E-01	735	3.83E-02
440	4.68E-01	540	7.69E-01	640	6.75E-01	740	3.11E-02
445	7.61E-01	545	7.99E-01	645	6.22E-01	745	2.61E-02
450	1.00E+00	550	8.28E-01	650	5.71E-01	750	1.56E-02
455	8.54E-01	555	8.57E-01	655	5.17E-01	755	1.32E-02
460	5.68E-01	560	8.83E-01	660	4.67E-01	760	5.85E-03
465	4.52E-01	565	9.06E-01	665	4.18E-01	765	3.67E-03
470	3.72E-01	570	9.24E-01	670	3.71E-01	770	3.09E-04
475	3.04E-01	575	9.44E-01	675	3.28E-01	775	3.83E-03
						780	7.11E-03



* 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	(0.225, 0.508)	(0.224, 0.505)
10	(0.221, 0.499)	(0.224, 0.506)
20	(0.222, 0.501)	(0.225, 0.506)
30	(0.222, 0.503)	(0.225, 0.507)
40	(0.223, 0.505)	(0.226, 0.509)
50	(0.223, 0.505)	(0.226, 0.510)
60	(0.225, 0.508)	(0.227, 0.512)
70	(0.221, 0.500)	(0.228, 0.513)
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	21.25 hour
		Total Operation Time	22.25 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.

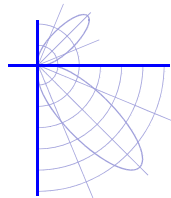
CIE (x, y) coordinates	± 0.004	CCT	± 150 K
CIE (u', v') coordinates	± 0.0025	CRI (Ra)	± 2
Δ (u', v') Colour difference	± 0.001	Scotopic / Photopic Ratio *	± 0.02
Relative Spectral Irradiance *	± 2 %	R9 *	± 2

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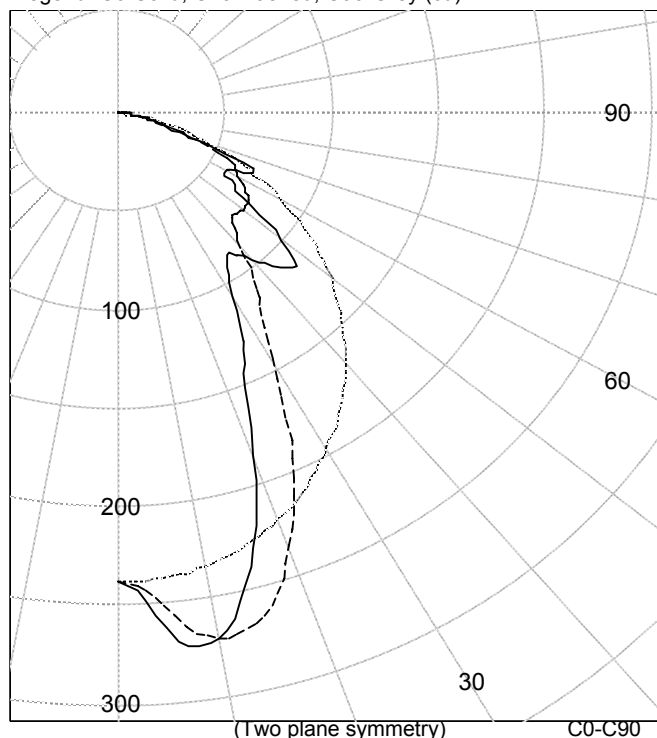
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Legend: C0-Solid, C45-Dashed, C90-Grey (cd)



AVERAGE LUMINANCE (cd / sq.m)

Gamma	C0	C45	C90
45.0	17855	12285	25213
55.0	12965	14575	23235
65.0	17712	15262	19083
75.0	7053	8279	13589
85.0	6134	6200	1571

INTENSITY SUMMARY (cd)

Gamma	C-Plane					Flux (lm)
	C0	C22.5	C45	C67.5	C90	
0.0	238	238	238	238	238	24
5.0	263	261	251	243	238	
10.0	272	273	272	252	234	
15.0	239	247	265	261	228	70
20.0	185	200	234	260	220	88
25.0	140	146	194	248	209	
30.0	108	120	144	226	196	
35.0	89	93	114	193	183	84
40.0	98	88	90	157	166	81
45.0	112	97	75	115	148	
50.0	100	106	77	82	130	
55.0	67	79	74	64	111	69
60.0	58	52	64	49	88	50
65.0	71	41	59	40	67	
70.0	37	50	35	28	46	
75.0	19	33	21	15	29	25
80.0	12	13	12	7	12	6
85.0	8	6	7	2	1	
90.0	5	3	4	0	0	

ZONAL FLUX AND PERCENTAGES

Zone	Flux (lm)	% Lamp	% Luminaire
0-30	182	N / A	36.5
0-40	267	N / A	53.4
0-60	417	N / A	83.4
0-90	498	N / A	99.7
40-90	231	N / A	46.3
60-90	81	N / A	16.3
90-180	1	N / A	0.3
0-180	499	N / A	100.0

Light Output Ratio = N / A

SHR-NOM = 0.75

SHR-MAX = 0.95

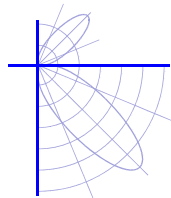
Calculated using the TM5
fine grid method.

CERTIFIED BY:

Kevin Monaghan
Authorised Signatory

Date of test
Date of report

14-Oct-2014
27-Oct-2014



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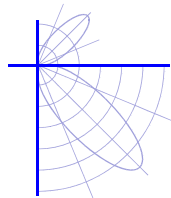
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Intensity data (cd)					
Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
0.0	238	238	238	238	238
2.5	246	246	243	240	238
5.0	263	261	251	243	238
7.5	274	273	265	246	236
10.0	272	273	272	252	234
12.5	260	265	271	258	232
15.0	239	247	265	261	228
17.5	216	227	253	262	224
20.0	185	200	234	260	220
22.5	157	171	217	255	215
25.0	140	146	194	248	209
27.5	127	133	168	238	203
30.0	108	120	144	226	196
32.5	96	102	125	209	190
35.0	89	93	114	193	183
37.5	90	87	103	175	174
40.0	98	88	90	157	166
42.5	105	93	81	136	157
45.0	112	97	75	115	148
47.5	113	102	75	96	139
50.0	100	106	77	82	130
52.5	82	98	76	73	121
55.0	67	79	74	64	111
57.5	61	63	70	56	99
60.0	58	52	64	49	88
62.5	64	43	62	44	77
65.0	71	41	59	40	67
67.5	59	46	48	35	57
70.0	37	50	35	28	46
72.5	24	49	27	21	38
75.0	19	33	21	15	29
77.5	15	20	16	10	19
80.0	12	13	12	7	12
82.5	9	9	9	4	5
85.0	8	6	7	2	1
87.5	6	4	5	1	0
90.0	5	3	4	0	0



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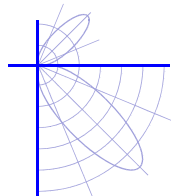
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Intensity data (cd)					
Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
90.0	5	3	4	0	0
92.5	3	2	3	0	0
95.0	2	1	2	0	0
97.5	1	1	1	0	0
100.0	0	0	0	0	0
102.5	0	0	0	0	0
105.0	0	0	0	0	0
107.5	0	0	0	0	0
110.0	0	0	0	0	0
112.5	0	0	0	0	0
115.0	0	0	0	0	0
117.5	0	0	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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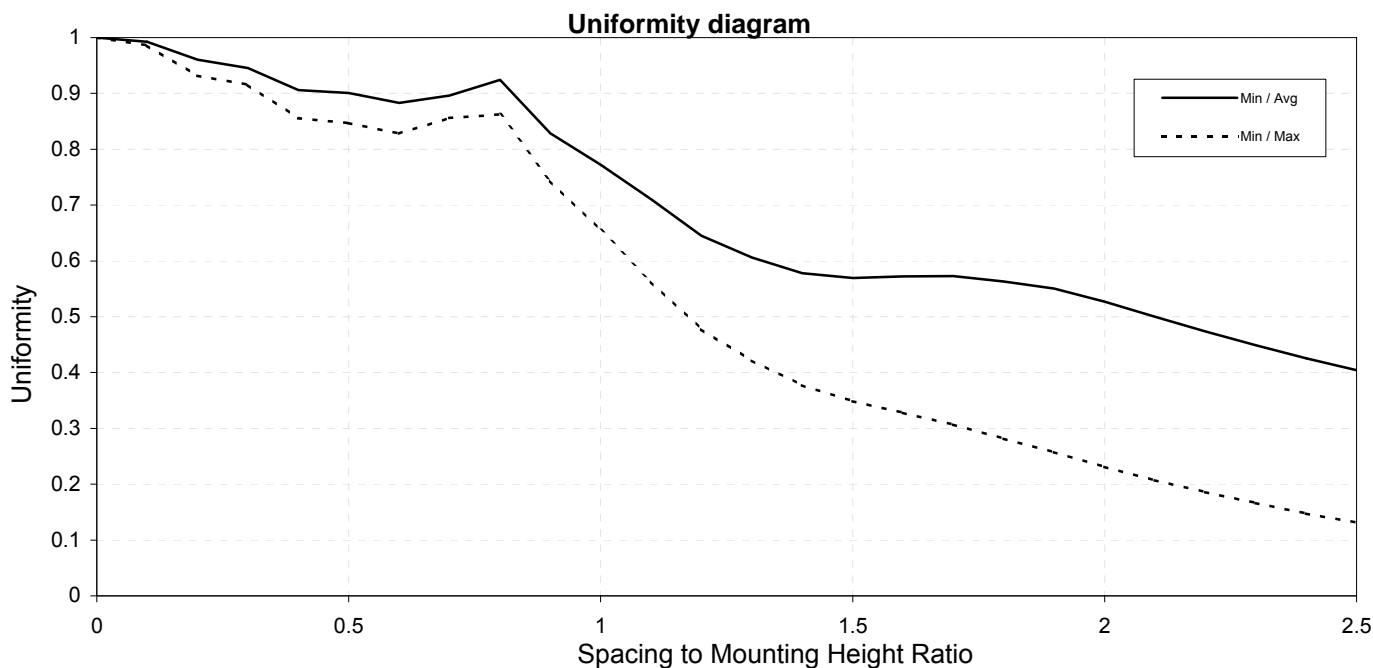
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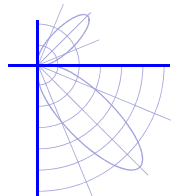
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Test Distance: 8.0 metres

Test Temperature: 25.1 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.