

Report of Test LL20366

Hawko Lighting Recessed LED Luminaire. Product ID: 38 Recessed 22W.
Extruded aluminium body with white finish, extent ~ 1019 x 45 x 39 mm deep.
Translucent diffuser forms luminous opening of 1010 x 33 mm.
Eighteen sections of Hawko LED strip centred 14 mm above L/O.
Remote Tridonic LCU 35W 24V SR TOP 100-277V 50/60Hz electronic driver.
Tested at 240 V 50 Hz.

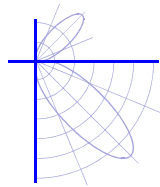


Performance Summary

Luminous flux	1980 lm
Luminaire Power	26.5 W
Luminous Efficacy	74.9 lm/W
SHR Nominal	1.50
SHR Maximum	1.64

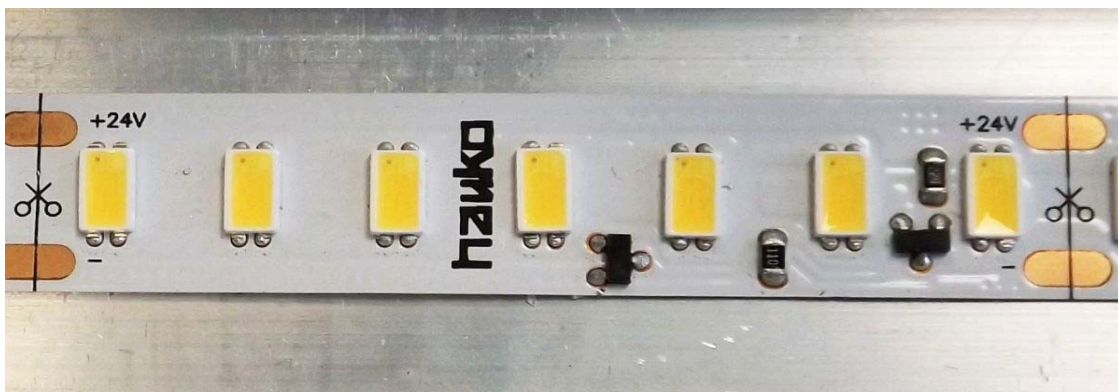
PREPARED FOR : Hawko Lighting, Caloundra. QLD. 4551.

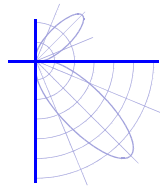




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LM-79 Performance Data

Spectral	CIE 1931 (x, y) ⁽¹⁾	(0.372, 0.368)
	CIE 1976 (u', v') ⁽¹⁾	(0.223, 0.497)
	Correlated Colour Temperature (CCT) ⁽¹⁾	4170 K
	Colour Spatial Uniformity ⁽²⁾	0.0021
	Colour Rendering Index (Ra) ⁽¹⁾	84.4
	Special CRI 9 (R ₉) ^{(1),(3)}	19
	Distance from Planckian Locus (Duv) ^{(1),(3)}	-0.0017
	Scotopic/Photopic Ratio ^{(1),(3)}	1.73
Electrical	Voltage	240 V
	Frequency	50 Hz
	Current	0.114 A
	Power	26.5 W
	Power Factor	0.96
	Current THD	13.3 %

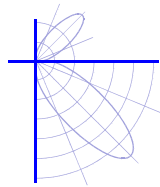
Performance data in accordance with IESNA LM-79-08. Spectral calculations are for a CIE 2° observer

(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





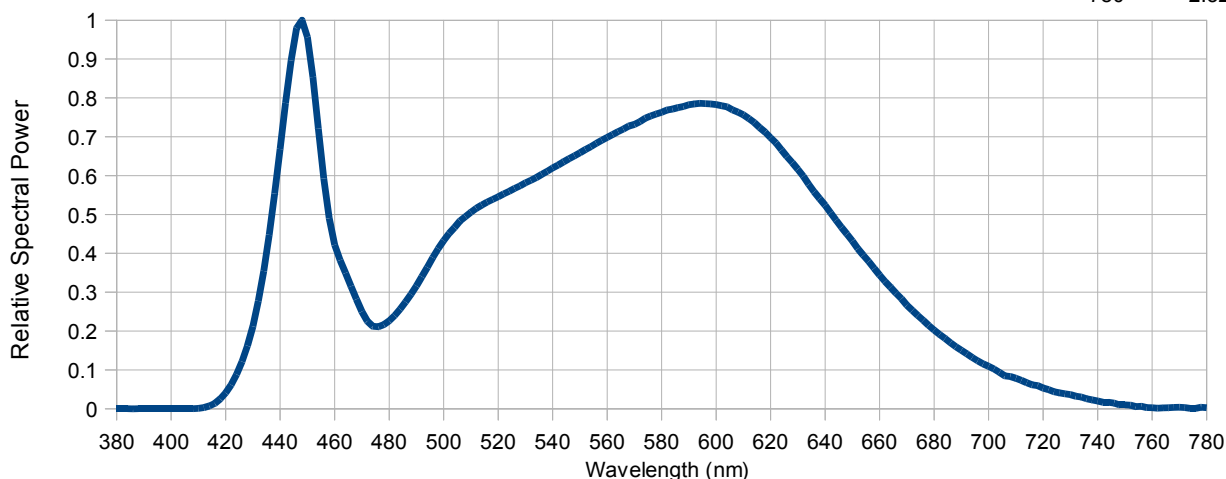
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LM-79 Performance Data

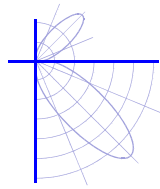
Summary Relative Spectral Irradiance Distribution (wavelength – nm, irradiance – relative to peak = 1)

380	0.00E+00	480	2.26E-01	580	7.63E-01	680	2.02E-01
385	2.03E-05	485	2.66E-01	585	7.73E-01	685	1.75E-01
390	6.32E-05	490	3.16E-01	590	7.83E-01	690	1.50E-01
395	3.19E-05	495	3.77E-01	595	7.86E-01	695	1.27E-01
400	2.73E-05	500	4.33E-01	600	7.83E-01	700	1.09E-01
405	1.23E-04	505	4.75E-01	605	7.73E-01	705	8.92E-02
410	1.00E-03	510	5.06E-01	610	7.56E-01	710	7.83E-02
415	1.03E-02	515	5.28E-01	615	7.30E-01	715	6.43E-02
420	4.09E-02	520	5.45E-01	620	6.98E-01	720	5.32E-02
425	1.05E-01	525	5.63E-01	625	6.58E-01	725	4.25E-02
430	2.12E-01	530	5.81E-01	630	6.16E-01	730	3.64E-02
435	4.01E-01	535	5.99E-01	635	5.68E-01	735	2.79E-02
440	6.68E-01	540	6.20E-01	640	5.24E-01	740	1.99E-02
445	9.38E-01	545	6.39E-01	645	4.76E-01	745	1.55E-02
450	9.56E-01	550	6.59E-01	650	4.32E-01	750	1.00E-02
455	6.57E-01	555	6.79E-01	655	3.87E-01	755	5.75E-03
460	4.22E-01	560	6.98E-01	660	3.44E-01	760	2.34E-03
465	3.32E-01	565	7.16E-01	665	3.05E-01	765	2.38E-03
470	2.50E-01	570	7.32E-01	670	2.66E-01	770	3.73E-03
475	2.12E-01	575	7.51E-01	675	2.34E-01	775	8.01E-04
						780	2.32E-03



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





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LM-79 Performance Data

Spatial measurements

Gamma angle (deg)	CIE 1976 (u',v') coordinates	
	C 0 plane	C 90 plane
0	(0.224, 0.498)	(0.224, 0.498)
10	(0.224, 0.498)	(0.224, 0.497)
20	(0.224, 0.497)	(0.224, 0.497)
30	(0.224, 0.497)	(0.224, 0.497)
40	(0.223, 0.497)	(0.224, 0.497)
50	(0.223, 0.496)	(0.223, 0.496)
60	(0.223, 0.496)	(0.223, 0.496)
70	(0.222, 0.495)	(0.223, 0.496)
80	(0.222, 0.495)	I <= 10 %
90	I <= 10 %	I <= 10 %

Spatial measurements

Gamma angle (deg)	CIE 1976 (u',v') coordinates	
	C 0 plane	C 90 plane
90	I <= 10 %	I <= 10 %
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

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 2 hour
Total Operation Time 3.25 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

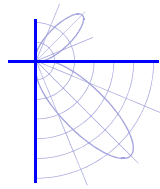
Yokogawa WT210 power meter connected in circuit to the sample electrical supply

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 v5.2 (1st Jul 2016)

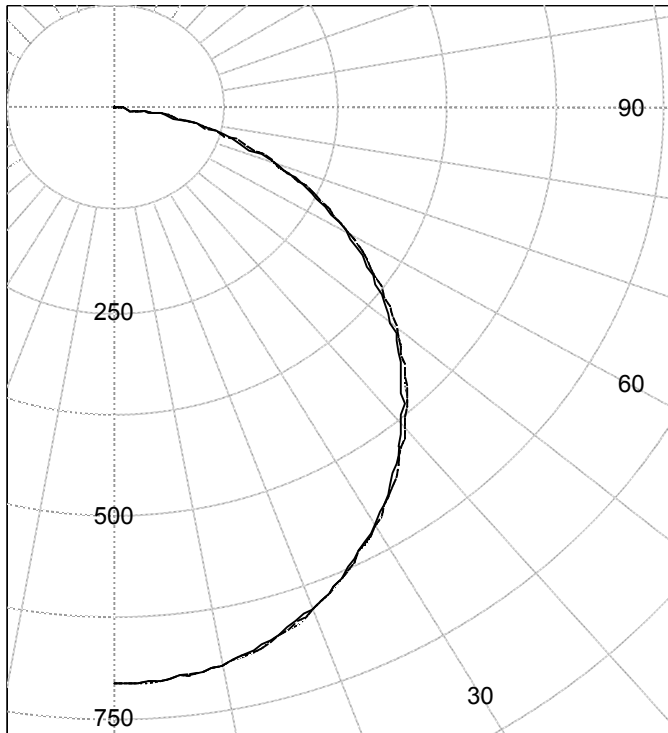




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Legend: C0-Solid, C45-Dashed, C90-Grey (cd)



(Two plane symmetry)

C0-C90

AVERAGE LUMINANCE (cd / sq.m)

Gamma	C0	C45	C90
45.0	19524	19765	19733
55.0	18598	18949	18867
65.0	17357	17629	17594
75.0	14696	14882	14842
85.0	7917	8146	7977

INTENSITY SUMMARY (cd)

Gamma	C-Plane					Flux (lm)
	C0	C22.5	C45	C67.5	C90	
0.0	708	708	708	708	708	
5.0	704	705	704	705	705	67
10.0	694	695	695	695	695	
15.0	677	678	678	678	678	191
20.0	653	654	655	655	655	
25.0	624	624	626	626	626	288
30.0	589	590	591	591	592	
35.0	549	551	552	554	552	345
40.0	506	508	511	510	510	
45.0	460	462	466	465	465	357
50.0	409	411	416	415	415	
55.0	356	358	362	361	361	322
60.0	301	303	307	307	306	
65.0	244	245	248	250	248	244
70.0	185	186	188	190	187	
75.0	127	128	128	129	128	135
80.0	69	71	71	72	71	
85.0	23	23	24	24	23	30
90.0	0	0	0	0	0	

ZONAL FLUX AND PERCENTAGES

Zone	Flux (lm)	% Lamp	% Luminaire
0-30	546	N / A	27.6
0-40	892	N / A	45.0
0-60	1571	N / A	79.3
0-90	1980	N / A	100.0
40-90	1089	N / A	55.0
60-90	409	N / A	20.7
90-180	0	N / A	0.0
0-180	1980	N / A	100.0

Total Light Output = 1980 lm

CERTIFIED BY:

Mikael Altoff
Authorised Signatory

SHR-NOM = 1.50
SHR-MAX = 1.64

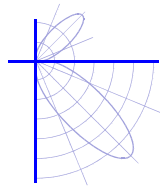
Calculated using the TM5
fine grid method.

Date of test
Date of report

21-Jul-2017
31-Jul-2017



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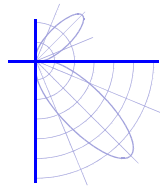
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Intensity data (cd)

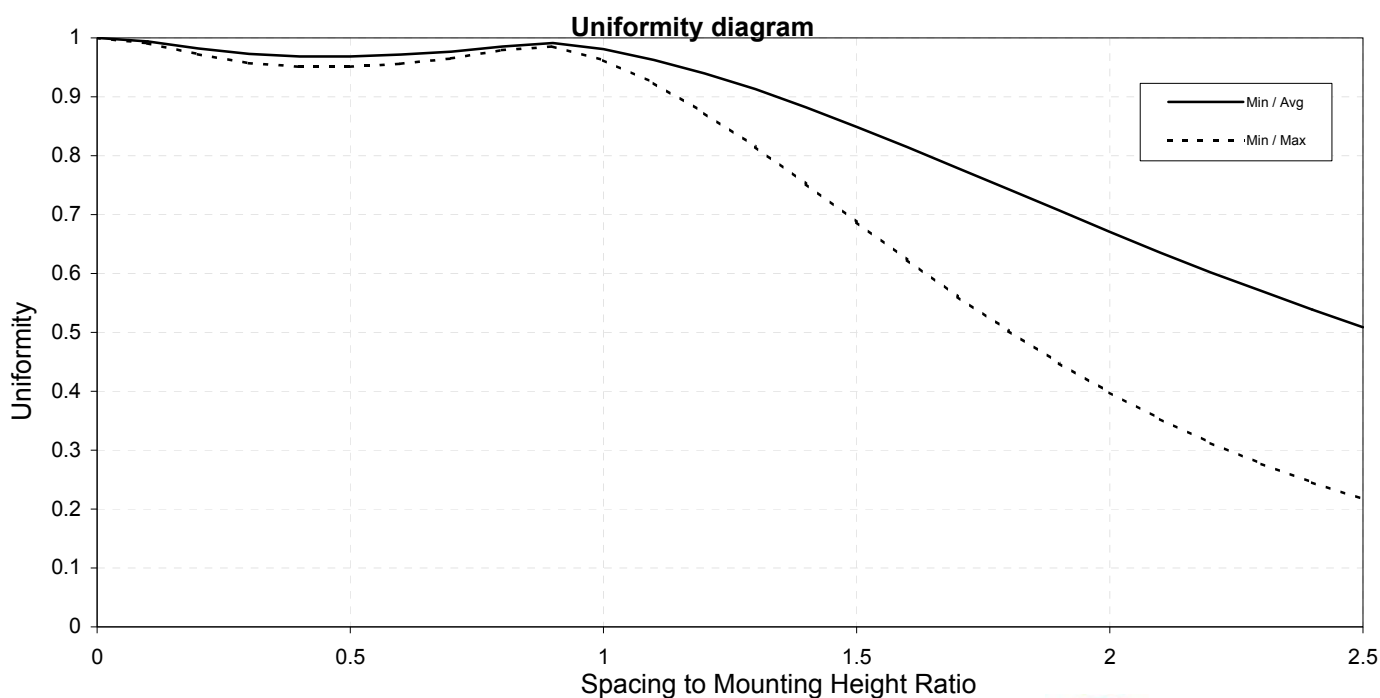
Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
0.0	708	708	708	708	708
2.5	707	707	707	707	707
5.0	704	705	704	705	705
7.5	700	700	700	701	701
10.0	694	695	695	695	695
12.5	686	687	687	687	688
15.0	677	678	678	678	678
17.5	665	667	667	667	667
20.0	653	654	655	655	655
22.5	639	640	641	642	641
25.0	624	624	626	626	626
27.5	607	608	609	610	609
30.0	589	590	591	591	592
32.5	569	571	573	574	573
35.0	549	551	552	554	552
37.5	529	531	533	533	532
40.0	506	508	511	510	510
42.5	484	486	488	488	488
45.0	460	462	466	465	465
47.5	434	436	440	440	441
50.0	409	411	416	415	415
52.5	383	384	389	389	389
55.0	356	358	362	361	361
57.5	328	330	334	335	335
60.0	301	303	307	307	306
62.5	271	273	277	278	277
65.0	244	245	248	250	248
67.5	215	216	218	220	219
70.0	185	186	188	190	187
72.5	156	157	159	161	158
75.0	127	128	128	129	128
77.5	98	98	100	101	98
80.0	69	71	71	72	71
82.5	45	46	45	46	44
85.0	23	23	24	24	23
87.5	7	8	8	8	7
90.0	0	0	0	0	0

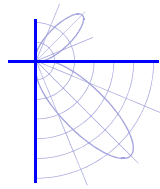




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Test Distance: 8.0 metres
Test Temperature: 25.1 degrees Celsius

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.

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.

