

Report of Test LL15785

Indice Ecotech 7W (nom.) LED "MR16" lamp. Product ID: LED 7W Ultra.

Vented plastic housing, finished matte black, with bi pin base 50 mm dia. x 56 mm deep (excluding pins). Front face specular "vacuum metalised polycarbonate" with conical indented reflector forming a luminous opening of 18 mm diameter. White LED above, filling reflector opening.

Integral driver. Tested at 12 V 50 Hz. Measured 715 mA.

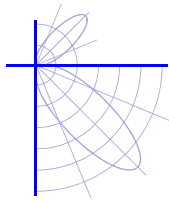


Performance Summary

Luminous flux	540 lm
Bare Lamp Power	7.76W
SHR Nominal	0.75
SHR Maximum	0.79

PREPARED FOR : Indice Ecotech Pty. Ltd., Richmond, VIC 3121.



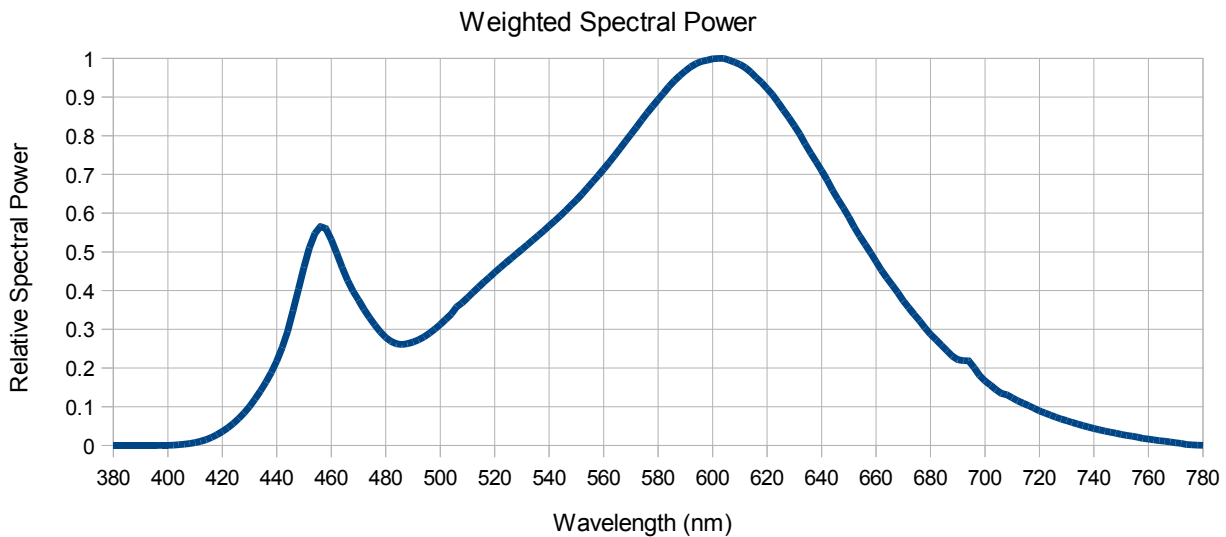


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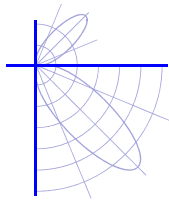
Performance data in accordance with IESNA LM-79 : 2008

Photometry	Total Luminous Flux	540 lm
	Luminous efficacy	69.6 lm/W
Electrical	Voltage	12.0 V
	Frequency	50.0 Hz
	Current	0.715 A
	Power	7.76 W
	Power Factor	0.9
Spectral	CIE 1931 2 deg observer (x, y) ⁽¹⁾	(0.427, 0.395)
	CIE 1976 2 deg observer (u', v') ⁽¹⁾	(0.248, 0.516)
	Correlated Colour Temperature (CCT) ⁽¹⁾	3100 K
	Colour Rendering Index (CRI) ⁽¹⁾	82
	Colour Spatial Uniformity ⁽²⁾	0.0056
	Scotopic/Photopic Ratio ^{(1),(3)}	1.41



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

- (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-79:2008



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Spatial measurements (lower hemisphere)

Gamma angle (deg)	CIE 1976 (u',v' coordinates)	
	C0 plane	C90 plane
0	(0.246, 0.512)	(0.247, 0.513)
5	(0.246, 0.511)	(0.246, 0.511)
10	(0.248, 0.515)	(0.248, 0.514)
15	(0.248, 0.515)	(0.248, 0.516)
20	(0.248, 0.516)	(0.248, 0.517)
25	(0.248, 0.518)	(0.249, 0.517)
30	(0.249, 0.518)	(0.248, 0.516)
35	(0.248, 0.517)	(0.248, 0.516)
40	(0.249, 0.518)	(0.249, 0.517)
45	I <= 10 %	I <= 10 %

Spatial measurements (upper hemisphere)

Gamma angle (deg)	CIE 1976 (u',v' coordinates)	
	C plane	C plane
45	I <= 10 %	I <= 10 %
50	I <= 10 %	I <= 10 %
55	I <= 10 %	I <= 10 %
60	I <= 10 %	I <= 10 %
65	I <= 10 %	I <= 10 %
70	I <= 10 %	I <= 10 %
75	I <= 10 %	I <= 10 %
80	I <= 10 %	I <= 10 %
85	I <= 10 %	I <= 10 %
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 the C0 and C90 planes at 10° gamma intervals from 0. 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	Beam downward	Stabilisation time	2.5 hour
		Total operation time	3.75 hour

Equipment and uncertainties

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

luminous intensity*	± 5 %	temperature*	± 1 °C
C, gamma angles*	± 0.25°	luminous efficacy	± 5 %

A 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 >5 times the maximum observed luminous opening dimension.

CIE (x, y) coordinates*	± 0.003	CCT*	± 100 K
CIE (u', v') coordinates	± 0.003	CRI	± 3
Δ (u', v') colour difference	± 0.0007	Scotopic / photopic ratio	± 0.02

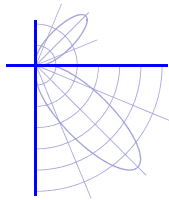
A Yokogawa WT210 power meter connected in circuit to the sample electrical supply

voltage*	± 0.1 %	frequency	± 0.1 Hz
current*	± 0.2 %	power*	± 0.5 %
		power factor	± 0.01

Accreditation & traceability

The laboratory is NATA accredited to ISO17025 : 2005 (details at www.nata.asn.au). The laboratory registration covers measurement and calculation of quantities indicated by *. Uncertainties calculated for this sample are at the 95% confidence interval with coverage factor k = 2 for measured and calculated quantities. All measurements are traceable through the Australian National Measurement Institute to International standards.

IESNA LM-79 : 2008 Calculator v3.6 (13th Sept 2012)



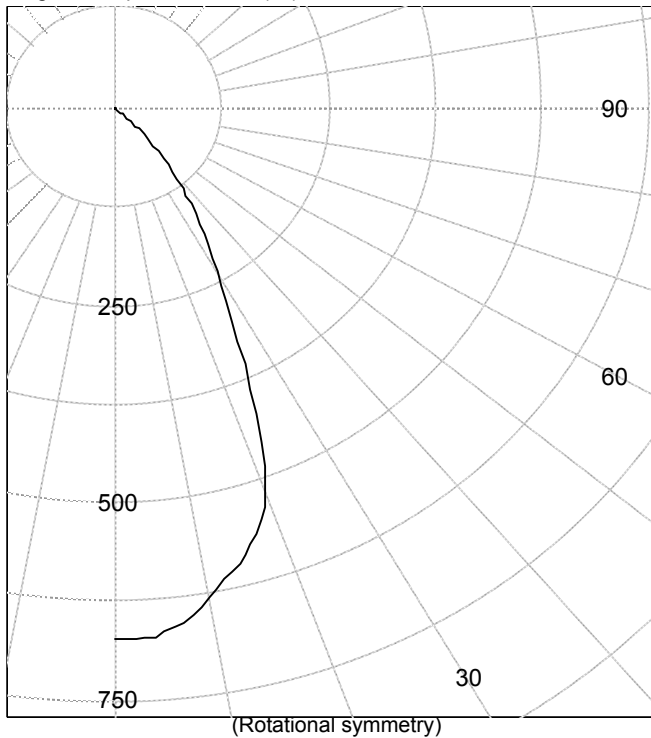
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Legend: All planes - Solid (cd)



AVERAGE LUMINANCE (cd / sq.m)

Gamma	C0
45.0	307667
55.0	5025
65.0	1501
75.0	1646
85.0	3412

INTENSITY SUMMARY (cd)

Gamma	All Planes	Flux (lm)	Gamma	C0	Flux (lm)
0	674		90	0	
5	669	63	95	0	0
10	631		100	0	0
15	588	164	105	0	0
20	514		110	0	0
25	358	165	115	0	0
30	239		120	0	0
35	163	102	125	0	0
40	105		130	0	0
45	55	43	135	0	0
50	17		140	0	0
55	1	3	145	0	0
60	0		150	0	0
65	0	0	155	0	0
70	0		160	0	0
75	0	0	165	0	0
80	0		170	0	0
85	0	0	175	0	0
90	0		180	0	0

ZONAL FLUX AND PERCENTAGES

Zone	Flux (lm)	%Lamp	%Luminaire
0-30	391	N / A	72.4
0-40	494	N / A	91.4
0-60	540	N / A	99.9
0-90	540	N / A	100.0
40-90	47	N / A	8.6
60-90	0	N / A	0.1
90-180	0	N / A	0.0
0-180	540	N / A	100.0

Light Output Ratio = N / A

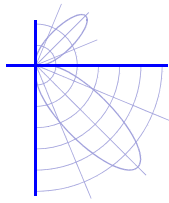
SHR-NOM = 0.75
SHR-MAX = 0.79

Calculated using the TM5
fine grid method.

CERTIFIED BY:

Kevin Monaghan
Authorised Signatory

Date of test 14-Sep-2012
Date of report 17-Sep-2012



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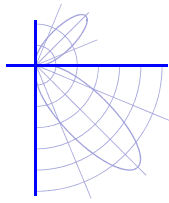
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Intensity (cd) and Flux (lm) data

Gamma	Intensity	Flux	Gamma	Intensity	Flux
0.0	674		90.0	0	
2.5	674		92.5	0	
5.0	669	63	95.0	0	
7.5	654		97.5	0	0
10.0	631		100.0	0	
12.5	610		102.5	0	
15.0	588	164	105.0	0	
17.5	559		107.5	0	0
20.0	514		110.0	0	
22.5	440		112.5	0	
25.0	358	165	115.0	0	
27.5	290		117.5	0	0
30.0	239		120.0	0	
32.5	196		122.5	0	
35.0	163	102	125.0	0	
37.5	133		127.5	0	0
40.0	105		130.0	0	
42.5	79		132.5	0	
45.0	55	43	135.0	0	
47.5	34		137.5	0	0
50.0	17		140.0	0	
52.5	6		142.5	0	
55.0	1	3	145.0	0	
57.5	0		147.5	0	0
60.0	0		150.0	0	
62.5	0		152.5	0	
65.0	0	0	155.0	0	
67.5	0		157.5	0	0
70.0	0		160.0	0	
72.5	0		162.5	0	
75.0	0	0	165.0	0	
77.5	0		167.5	0	0
80.0	0		170.0	0	
82.5	0		172.5	0	
85.0	0	0	175.0	0	
87.5	0		177.5	0	0
90.0	0		180.0	0	

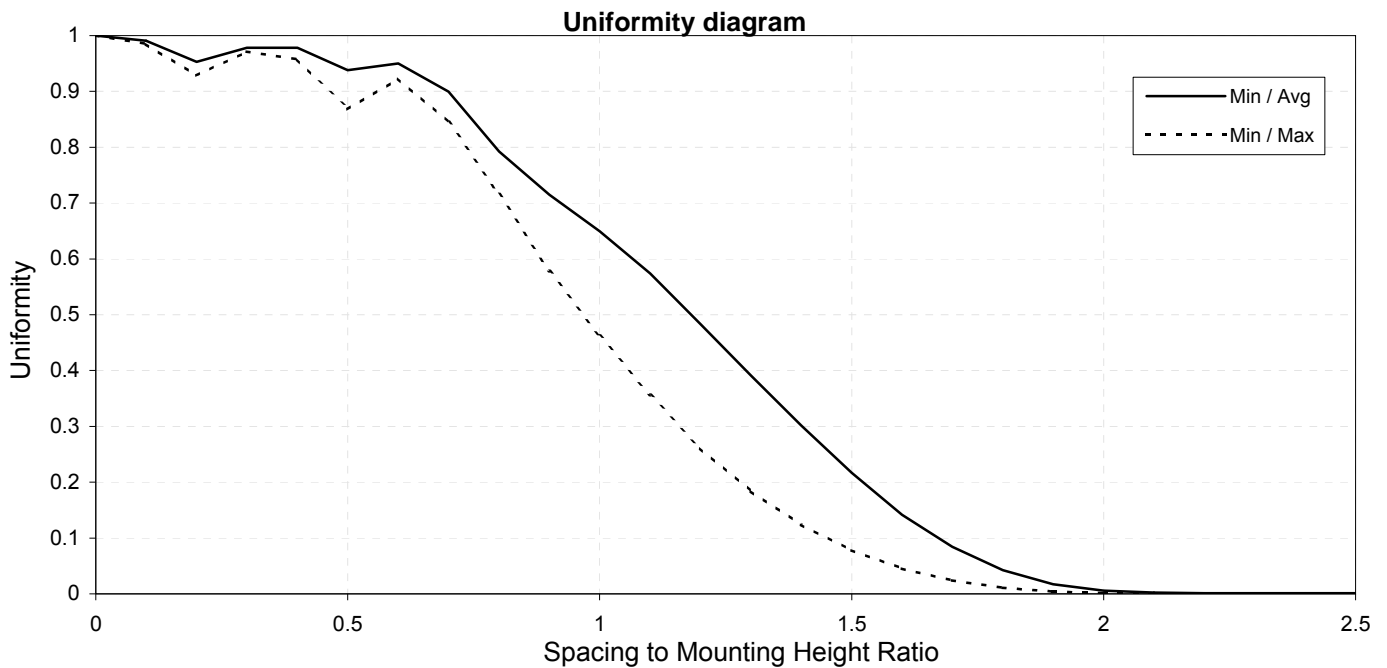


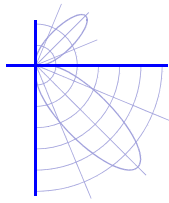
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Test Distance: 8.0 metres
Test Temperature: 24.9 degrees Celsius

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 +/- 0.25 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.