

Report of Test LL15597

A1 Insights /Unilumin Group Co., LED Street Light. Product ID: UNISTAA-03-01.

Cast aluminium body 346 x 816 x 163 mm (nom.) with off-white finish and unpainted cover above light opening. Luminous opening of 260 x 360 mm (nom.) contains five panels each containing two rows of eight "Cree" LED's, total of 80 LED's. Hinged upper section houses "Inventronics, EUC-200S070ST" 100-277Vac 50/60Hz LED driver. Tested with L/O in the horizontal position.

Tested at 240V 50Hz, measured 766 mA, efficacy = 82.5 lm/W.

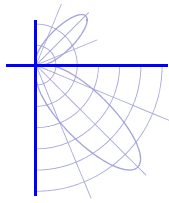


Performance Summary

Luminous flux	14696 lm
Luminaire Power	178.1 W

PREPARED FOR : A1 Insights Pty. Ltd./Unilumin Group Co. Ltd., Kent Town, SA. 5067.





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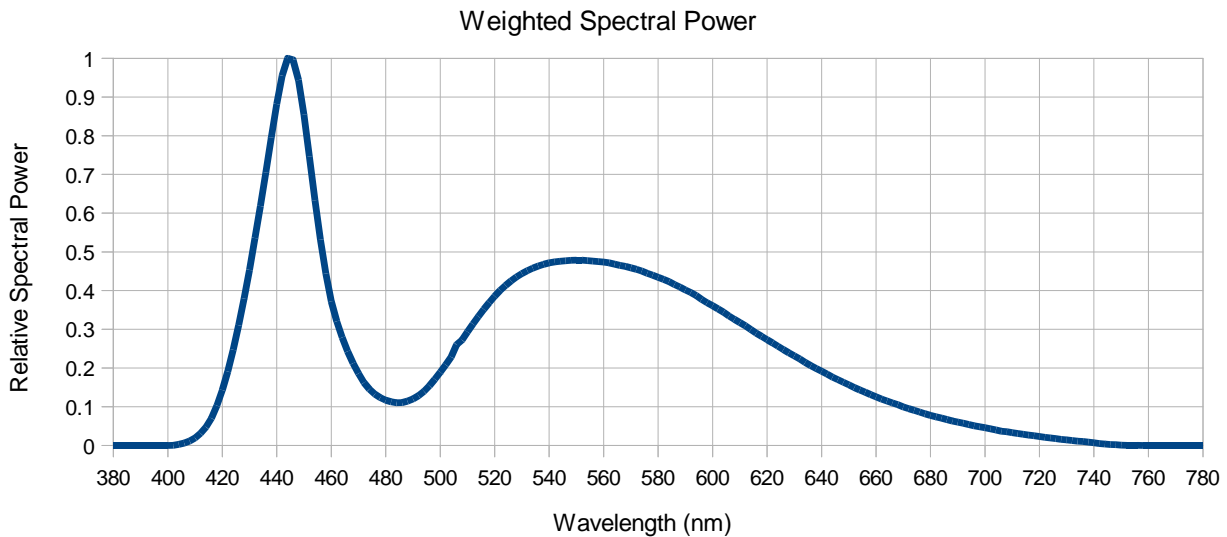
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277Vac 50/60Hz LED driver. Tested with L/O in the horizontal position.

Tested at 240V 50Hz, measured 766 mA, efficacy = 82.5 lm/W.

Performance data in accordance with IESNA LM-79 : 2008

Photometry	Total Luminous Flux	14696 lm
	Luminous efficacy	82.5 lm/W
Electrical	Voltage	240 V
	Frequency	50 Hz
	Current	0.766 A
	Power	178.1 W
	Power Factor	0.97
Spectral	CIE 1931 2 deg observer (x, y) ⁽¹⁾	(0.307, 0.315)
	CIE 1976 2 deg observer (u', v') ⁽¹⁾	(0.200, 0.460)
	Correlated Colour Temperature (CCT) ⁽¹⁾	6960 K
	Colour Rendering Index (CRI) ⁽¹⁾	72
	Colour Spatial Uniformity ⁽²⁾	0.0178
	Scotopic/Photopic Ratio ^{(1),(3)}	2.05

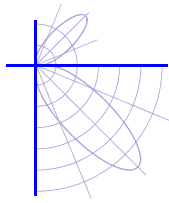


* The spectral power graph combines the weighted spectral power distributions of all spatial measurements.

(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	(0.200, 0.444)	(0.199, 0.445)
10	(0.200, 0.444)	(0.199, 0.442)
20	(0.200, 0.446)	(0.200, 0.442)
30	(0.200, 0.448)	(0.200, 0.445)
40	(0.200, 0.452)	(0.200, 0.449)
50	(0.200, 0.457)	(0.200, 0.456)
60	(0.200, 0.464)	(0.199, 0.464)
70	(0.200, 0.473)	(0.199, 0.475)
80	(0.197, 0.474)	I <= 10 %
90	I <= 10 %	I <= 10 %

Spatial measurements (upper hemisphere)

Gamma angle (deg)	CIE 1976 (u',v' coordinates)	
	C plane	C 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 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	4.25 hour
		Total operation time	6.25 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

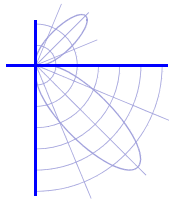
A Yokogawa WT210 power meter connected in circuit to the sample electrical supply

voltage*	± 0.1 %	frequency	± 0.1 Hz
current*	± 0.1 %	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.

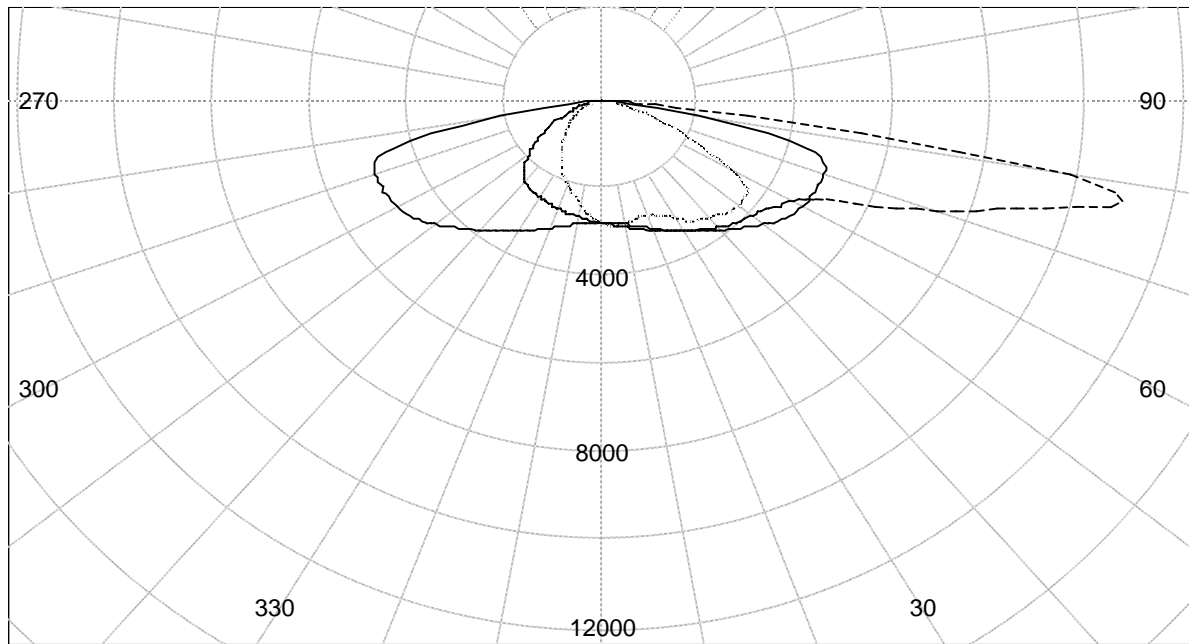
IESNA LM-79 : 2008 Calculator v3.2 (14th May 2012)



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Polar Light Distribution Curves



Kerbside / Downstream C0-Solid, Plane of maximum-Dashed, C90-Grey (cd) **Streetside / Upstream**

Street Lantern Summary: Report data as tested.

Percentage Outputs

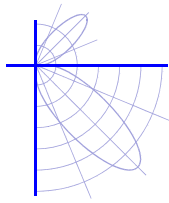
	Upward	Downward	Total
Street Side	N / A	N / A	N / A
House Side	N / A	N / A	N / A

Luminaire Efficiency (Light Output Ratio) N / A

Certified by:

Kevin Monaghan
 Authorised Signatory

Date of test 3-Jul-2012
 Date of report 4-Jul-2012



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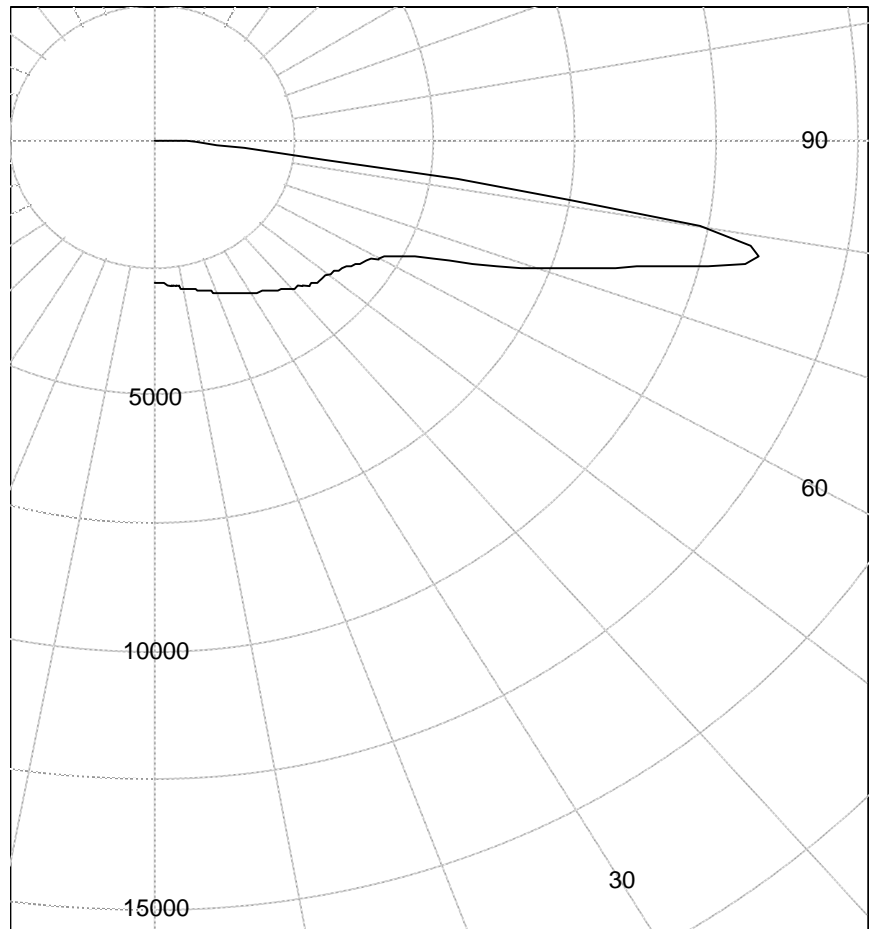
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Intensity
in principal plane

Principal Vertical Plane

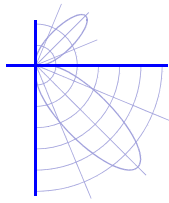
Gamma (Degrees)	Intensity (cd)
0.0	2790.0
10.0	2936.7
20.0	3169.9
30.0	3459.1
35.0	3604.9
40.0	3784.1
45.0	3986.4
47.5	4041.0
50.0	4083.7
52.5	4160.5
55.0	4284.7
57.5	4432.7
60.0	4624.8
62.5	4891.3
65.0	5474.0
67.5	6341.3
70.0	7396.0
72.5	8346.4
75.0	9522.1
77.5	10966.1
80.0	9854.7
82.5	3766.5
85.0	1125.0
87.5	476.5
90.0	96.8
92.5	17.5
95.0	10.1
97.5	6.4
100.0	4.3
102.5	3.7
105.0	3.4
120.0	4.5
135.0	0.0
150.0	0.0
165.0	0.0
180.0	0.0



Legend: Plane of maximum intensity (cd)

	Maximum Intensity
House Side	4927.1 cd @ (0.0, 69.5)
Street Side	11023.5 cd @ (30.0, 78.0)

Note: The coordinate pairs in the above table are expressed in degrees and have the format (C plane, Gamma angle).
Data for the two symmetric halves of the luminaire has been averaged.



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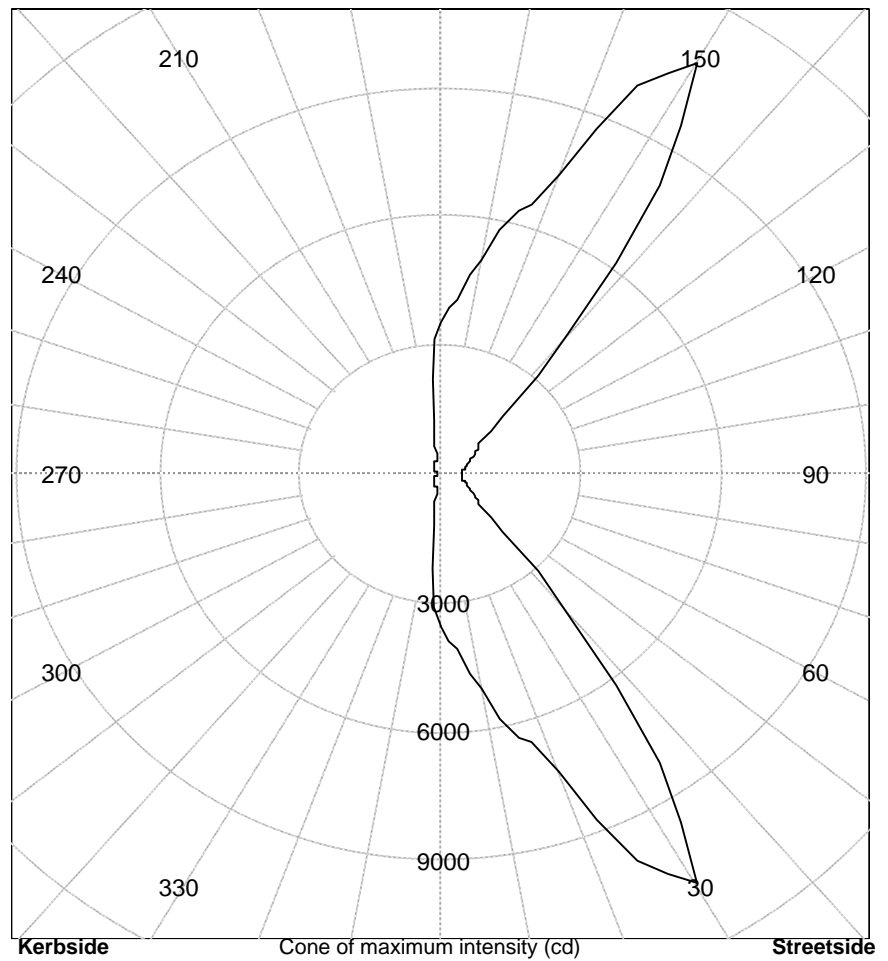
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Principal Conical Surface

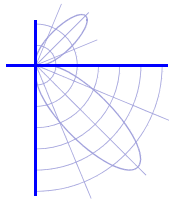
Intensity
in principal cone

C-Plane (Degrees)	Intensity (cd)
90.0	439.1
75.0	498.0
60.0	777.8
50.0	1054.6
45.0	1893.0
40.0	4214.5
35.0	8168.6
30.0	11023.5
25.0	9977.5
20.0	7401.4
15.0	6354.0
10.0	5072.4
5.0	4097.5
0.0	3558.2
355.0	2204.6
350.0	643.5
345.0	376.9
340.0	297.7
335.0	271.9
330.0	252.5
325.0	234.0
320.0	217.1
315.0	199.5
310.0	176.3
300.0	140.2
285.0	94.6
270.0	80.5



	Maximum Intensity
House Side	4927.1 cd @ (0.0, 69.5)
Street Side	11023.5 cd @ (30.0, 78.0)

Note: The coordinate pairs in the above table are expressed in degrees and have the format (C plane, Gamma angle).
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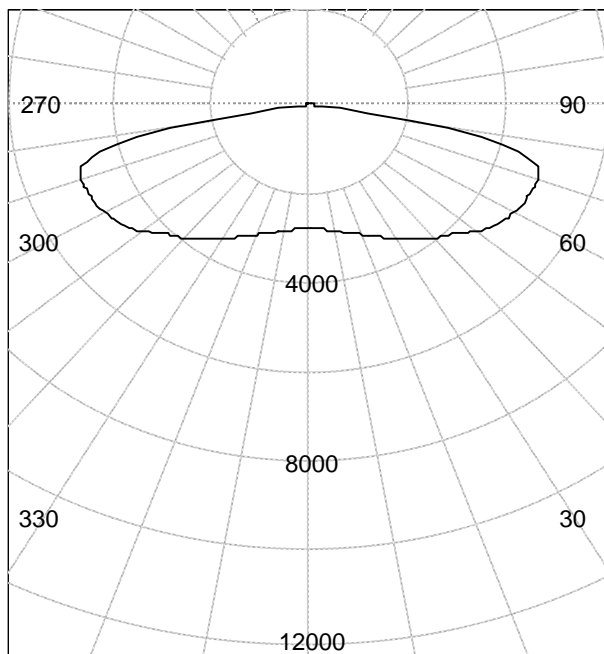
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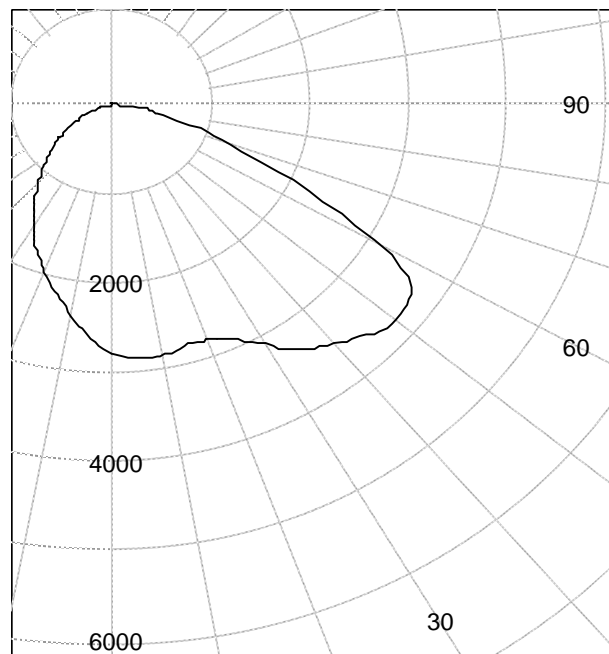
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Polar curve through CIE C0 / C180



Polar curve through CIE C90 / C270



**Downstream
(C180)**

(cd)

**Upstream
(C0)**

**Kerbside
(C270)**

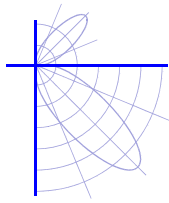
(cd)

**Streetside
(C90)**

Performance Parameters

I_{80}	=	2087.0	cd
I_{88}	=	26.2	cd
I_{90}	=	10.4	cd
I_{80} / I_{88}	=	79.694	

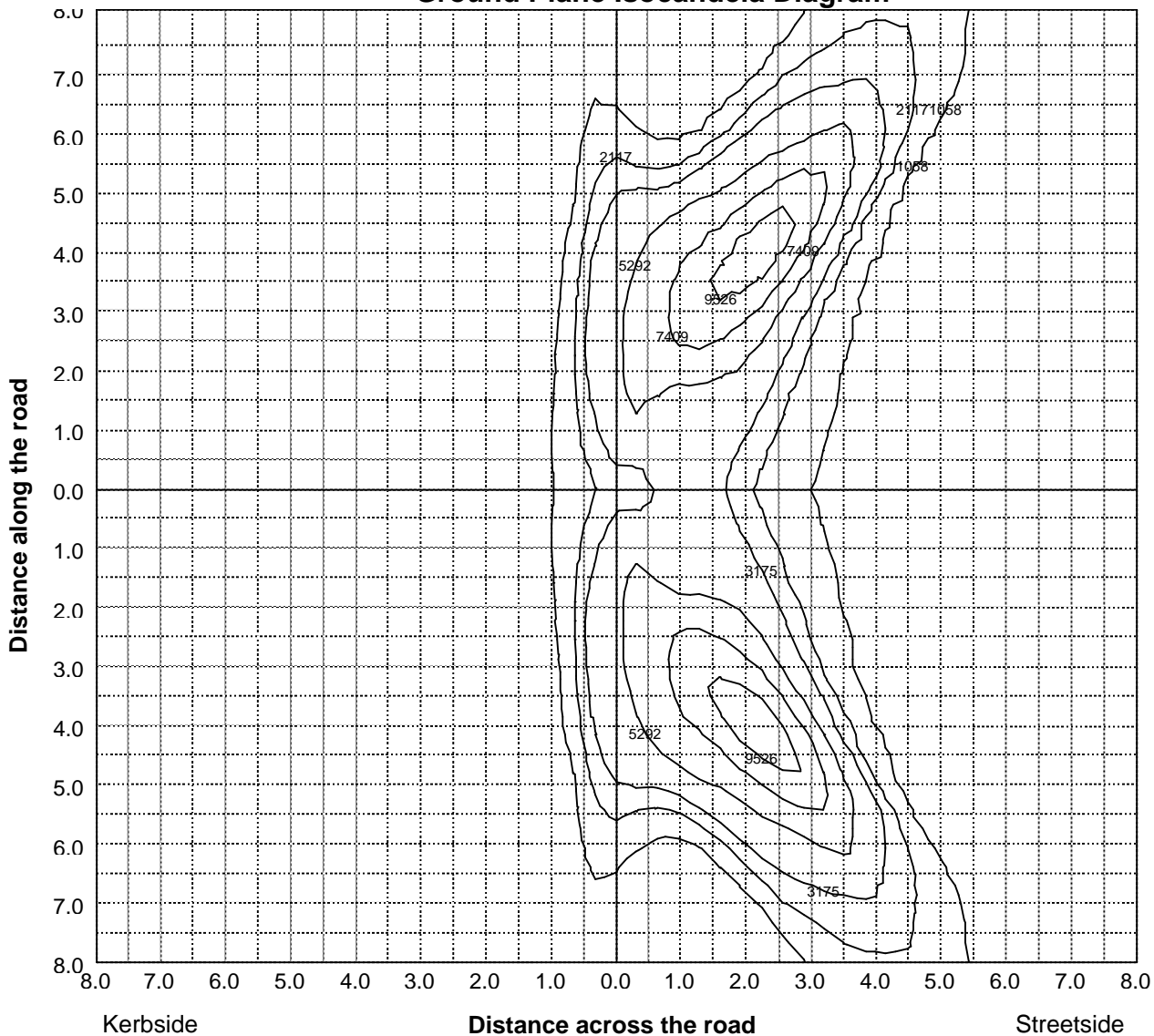
Note: The intensity values listed (I_{xx}) are all within the C0 half plane, the subscript refers to the gamma angle.



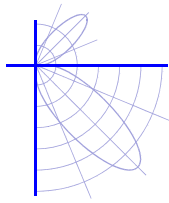
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Ground Plane Isocandela Diagram



Note: The isocandela levels are based on a mounting height of H = 10.0 metres. Grid values show multiples of mounting height.
 The isocandela contours are set to 10%, 20%, 30%, 50%, 70%, 90% of the maximum.
 The isocandela contour units are expressed as candela. Upstream and downstream sides have been averaged.



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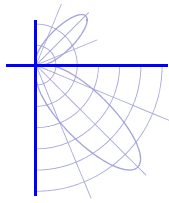
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KERB SIDE INTENSITY DATA (cd)

Gamma	C-Plane								
	C270	C285	C300	C310	C315	C320	C325	C330	C335
0.0	2790	2790	2790	2790	2790	2790	2790	2790	2790
10.0	2412	2436	2498	2555	2591	2622	2658	2692	2728
20.0	2014	2054	2175	2289	2362	2436	2530	2621	2720
30.0	1561	1625	1821	2017	2134	2257	2399	2542	2709
35.0	1360	1423	1612	1813	1960	2125	2311	2498	2697
40.0	1167	1231	1429	1614	1743	1919	2158	2408	2662
45.0	1000	1030	1229	1426	1546	1689	1915	2215	2551
47.5	920	934	1121	1316	1440	1584	1780	2079	2454
50.0	823	837	999	1187	1309	1460	1645	1913	2324
52.5	745	755	888	1057	1180	1325	1516	1750	2151
55.0	669	677	777	915	1025	1167	1347	1587	1957
57.5	601	599	686	801	887	1007	1175	1404	1759
60.0	514	518	596	690	755	854	997	1215	1547
62.5	433	434	513	592	642	718	821	1005	1321
65.0	362	363	427	499	547	604	682	805	1044
67.5	310	307	354	411	450	501	556	634	802
70.0	263	265	295	344	379	412	460	514	609
72.5	180	202	242	278	304	337	372	408	473
75.0	130	139	189	232	252	274	300	330	370
77.5	86	100	147	186	206	224	242	262	286
80.0	45	66	109	143	162	175	184	199	222
82.5	1	31	75	104	120	125	140	153	173
85.0	0	12	40	66	73	81	101	121	134
87.5	0	2	11	25	26	34	45	62	73
90.0	0	0	1	3	5	7	9	13	17
92.5	0	0	0	1	2	2	4	4	5
95.0	0	0	0	0	1	1	2	2	3
97.5	0	0	0	0	0	0	1	1	1
100.0	0	0	0	0	0	0	0	0	0
102.5	0	0	0	0	0	0	0	0	0
105.0	0	0	0	0	0	0	0	1	1
120.0	2	2	2	2	2	2	2	2	2
135.0	0	0	0	0	0	0	0	0	0
150.0	0	0	0	0	0	0	0	0	0
165.0	0	0	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	0



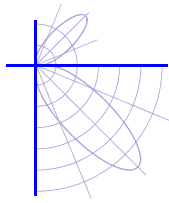
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Gamma	KERB SIDE		INTENSITY DATA (cd)				ROAD SIDE			
	C340	C345	C350	C355	C-Plane		C10	C15	C20	
					C0	C5				
0.0	2790	2790	2790	2790	2790	2790	2790	2790	2790	2790
10.0	2762	2796	2825	2851	2874	2894	2908	2919	2927	2927
20.0	2812	2900	2985	3049	3110	3159	3199	3218	3215	3215
30.0	2891	3064	3219	3345	3460	3563	3639	3629	3588	3588
35.0	2914	3147	3346	3513	3666	3829	3906	3880	3810	3810
40.0	2909	3184	3446	3677	3891	4127	4245	4193	4078	4078
45.0	2864	3176	3510	3806	4116	4449	4618	4562	4412	4412
47.5	2823	3163	3533	3880	4247	4636	4811	4760	4561	4561
50.0	2758	3151	3553	3967	4415	4865	5072	4999	4758	4758
52.5	2667	3137	3577	4050	4562	5079	5308	5243	4974	4974
55.0	2542	3117	3621	4126	4684	5277	5537	5490	5179	5179
57.5	2381	3087	3685	4198	4761	5410	5714	5680	5361	5361
60.0	2155	3043	3749	4276	4831	5532	5861	5883	5617	5617
62.5	1895	2911	3776	4346	4879	5616	5967	6075	5931	5931
65.0	1590	2580	3756	4417	4902	5631	6075	6267	6397	6397
67.5	1212	2153	3574	4446	4915	5612	6173	6485	6969	6969
70.0	852	1614	3137	4386	4922	5595	6324	6794	7702	7702
72.5	591	1010	2420	4113	4874	5577	6454	7253	8597	8597
75.0	441	631	1579	3535	4575	5355	6453	7507	9040	9040
77.5	315	398	757	2410	3850	4409	5485	6749	7713	7713
80.0	243	286	403	1216	2087	1621	1883	3418	5067	5067
82.5	193	212	257	456	362	158	176	423	1921	1921
85.0	141	144	170	210	106	61	83	153	414	414
87.5	82	73	79	69	33	31	46	73	164	164
90.0	21	23	26	17	10	14	21	28	45	45
92.5	7	6	7	8	8	9	10	15	16	16
95.0	4	4	5	6	6	7	7	10	11	11
97.5	2	2	3	3	3	3	4	7	7	7
100.0	1	1	1	1	1	1	0	3	4	4
102.5	1	0	1	1	0	0	0	3	4	4
105.0	1	1	1	1	0	0	0	3	3	3
120.0	2	2	2	2	1	2	1	5	4	4
135.0	0	0	0	0	0	0	0	0	0	0
150.0	0	0	0	0	0	0	0	0	0	0
165.0	0	0	0	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	0	0



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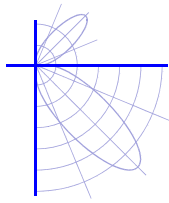
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ROAD SIDE INTENSITY DATA (cd)

Gamma	C-Plane								
	C25	C30	C35	C40	C45	C50	C60	C75	C90
0.0	2790	2790	2790	2790	2790	2790	2790	2790	2790
10.0	2936	2937	2933	2930	2920	2912	2893	2873	2862
20.0	3198	3170	3129	3095	3039	2991	2902	2825	2803
30.0	3531	3459	3370	3306	3228	3178	3111	3098	3106
35.0	3714	3605	3504	3430	3338	3306	3305	3339	3350
40.0	3933	3784	3657	3560	3484	3474	3467	3493	3500
45.0	4196	3986	3779	3685	3606	3585	3591	3631	3653
47.5	4301	4041	3820	3743	3658	3638	3664	3719	3728
50.0	4428	4084	3851	3793	3705	3704	3782	3796	3762
52.5	4589	4161	3911	3838	3760	3799	3905	3812	3737
55.0	4728	4285	4023	3905	3862	3947	4025	3791	3694
57.5	4873	4433	4146	4032	4026	4121	4070	3747	3542
60.0	5076	4625	4363	4299	4281	4264	4079	3514	3055
62.5	5378	4891	4701	4632	4490	4370	4041	3071	2484
65.0	5946	5474	5202	4968	4695	4486	3796	2583	2006
67.5	6904	6341	5749	5271	4889	4569	3318	2075	1540
70.0	7944	7396	6324	5573	5054	4251	2700	1440	1181
72.5	8942	8346	7053	5890	4679	3537	1786	1159	973
75.0	9945	9522	7837	5534	3767	2345	1198	845	671
77.5	10145	10966	8200	4545	2199	1215	814	544	451
80.0	7294	9855	6823	2405	1031	717	599	419	382
82.5	2982	3766	2598	711	469	423	397	325	287
85.0	1013	1125	664	372	254	235	220	218	149
87.5	368	477	276	178	115	107	104	110	88
90.0	79	97	71	45	36	33	37	42	36
92.5	17	17	16	14	11	10	8	8	8
95.0	10	10	8	7	6	6	4	3	2
97.5	7	6	5	5	3	3	3	1	0
100.0	4	4	4	3	2	2	2	0	0
102.5	4	4	2	3	1	1	1	1	0
105.0	4	3	2	2	0	1	0	0	0
120.0	4	4	3	3	1	1	1	1	2
135.0	0	0	0	0	0	0	0	0	0
150.0	0	0	0	0	0	0	0	0	0
165.0	0	0	0	0	0	0	0	0	0
180.0	0	0	0	0	0	0	0	0	0



Certified Test Report No. LL15597

A1 Insights /Unilumin Group Co., LED Street Light. Product ID: UNISTAA-03-01.

Cast aluminium body 346 x 816 x 163 mm (non.) with off-white finish and unpainted cover above light opening. Luminous opening of 260 x 360 mm (nom.) contains five panels each containing two rows of eight "Cree" LED's, total of 80 LED's. Hinged upper section houses "Inventronics, EUC-200S070ST" 100-277Vac 50/60Hz LED driver. Tested with L/O in the horizontal position.

Tested at 240V 50Hz, measured 766 mA, efficacy = 82.5 lm/W.

Test Distance: 8.0 metres
Test Temperature: 24.8 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 Publications Numbers 121 (1996) and 34 (1977).