LightLab INTERNATIONAL ALLENTOWN LLC

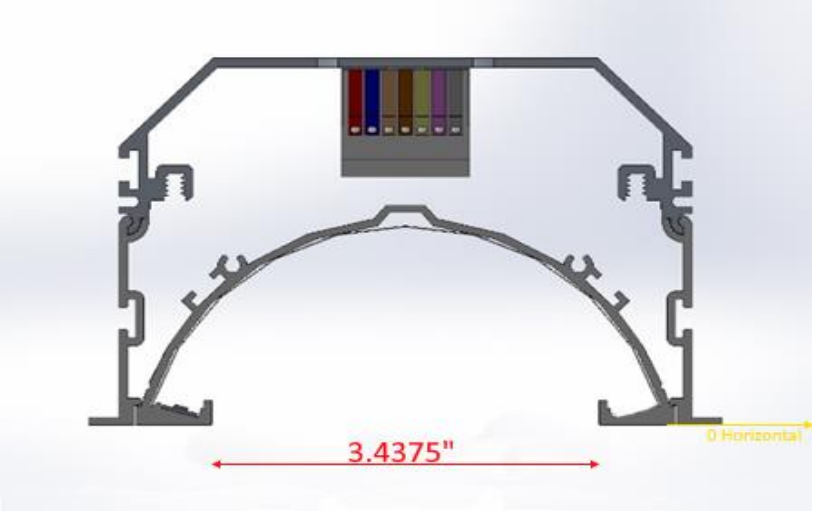
NVLAP TESTING Lab Code: 201079-0

Report of Test

LLIA001607-003A

Indoor Distribution Photometry Test Report

Catalog Number: ARR-ASYM-MO-K40-80-4-XX-120-DIM1
Recessed mounted, aluminum housing, steel end caps, aluminum reflector/LED holder and white painted ends, white plastic reflector sheet, open bottom.
One energized row of 184 white LEDs aimed up with one-piece diffuse plastic lens above LEDs
One Osram OTi30/120-277/1A0DIM-1LG2 LED driver labeled as 200mA



Prepared For:
Precision Architectural Lighting
4830 Timber Creek Drive
Houston, TX 77017, USA

Performance Summary					
Input Voltage	120.0	Vac	Luminous Flux	797.7	Lumens
Input Current	0.0733	A	Total Efficacy	98.2	Lm/W
Input Power	8.12	W	Downward Flux	797.7	Lumens
Frequency	60.00	Hz	Downward Flux	100.0	% of Total
Power Factor	0.923				
Current THD	20.8	%			

This test report was issued by LightLab International Allentown, LLC without alterations or erasures.

Test date: 12/16/2021
Report date: 12/16/2021

Signed: Michael L. Grather

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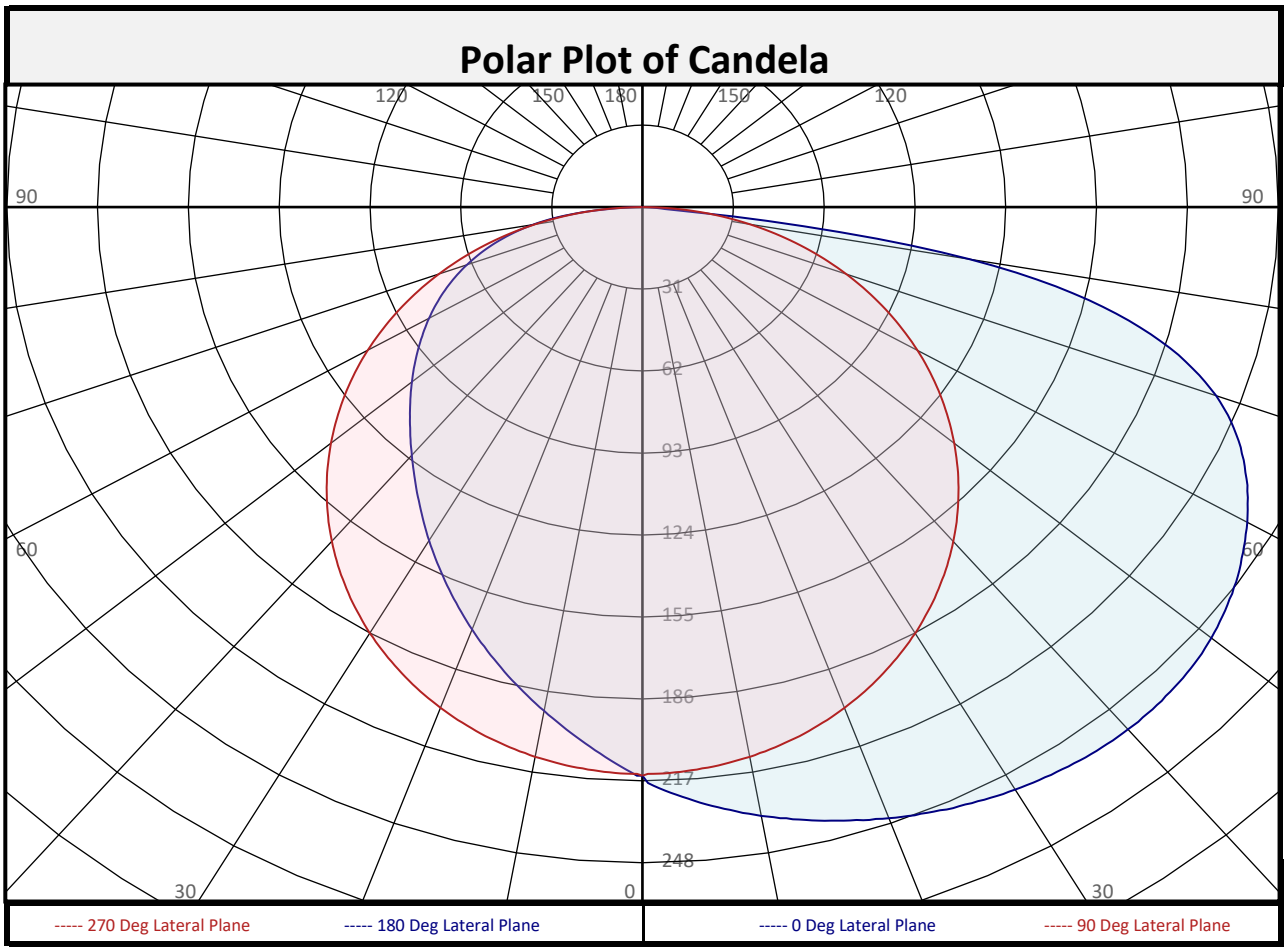

Zonal Flux Summary

Zone (Deg Vert)	Flux (Lumens)	Percent of Total	Zone (Deg Vert)	Flux (Lumens)	Percent of Total	Zone (Deg Vert)	Flux (Lumens)	Percent of Total
0-10	20.4	2.6%	90-100	0.0	0.0%	0-20	79.3	9.9%
10-20	58.9	7.4%	100-110	0.0	0.0%	0-30	171.0	21.4%
20-30	91.7	11.5%	110-120	0.0	0.0%	0-40	287.0	36.0%
30-40	115.9	14.5%	120-130	0.0	0.0%	0-60	549.3	68.9%
40-50	129.9	16.3%	130-140	0.0	0.0%	0-80	768.3	96.3%
50-60	132.4	16.6%	140-150	0.0	0.0%	10-90	777.3	97.4%
60-70	122.7	15.4%	150-160	0.0	0.0%	20-50	337.5	42.3%
70-80	96.3	12.1%	160-170	0.0	0.0%	40-90	510.8	64.0%
80-90	29.4	3.7%	170-180	0.0	0.0%	60-90	248.5	31.2%
0-90	797.7	100.0%	90-180	0.0	0.0%	0-180	797.7	100.0%

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Luminous Intensity (Candela) Table

Vertical (Gamma) Angles - Data was acquired in 0.5° increments, 2.5° increments shown.	Lateral (C-Plane) Angles								
	0	22.5	45	67.5	90	112.5	135	157.5	180
0	215	215	215	215	215	215	215	215	215
2.5	222	220	218	216	214	212	211	210	211
5	226	224	221	218	214	209	206	205	205
7.5	230	228	224	219	212	206	202	200	199
10	234	231	226	219	211	203	197	194	193
12.5	237	234	228	219	209	199	192	189	188
15	240	237	229	219	207	195	187	183	182
17.5	243	239	230	218	204	191	182	177	176
20	246	241	231	217	202	187	177	171	170
22.5	248	243	231	215	198	182	171	166	164
25	251	245	231	213	195	177	165	159	158
27.5	253	246	231	211	190	171	159	153	152
30	254	247	230	208	186	166	153	147	146
32.5	256	248	230	205	181	160	147	141	140
35	257	249	228	202	176	153	141	135	134
37.5	258	249	227	198	171	147	134	129	128
40	258	249	225	195	165	140	128	123	123
42.5	258	248	223	190	159	134	121	118	117
45	257	247	221	186	152	127	115	112	112
47.5	256	246	218	181	146	120	109	107	107
50	253	243	215	176	139	112	102	102	103
52.5	251	240	212	171	132	105	97	97	98
55	247	237	208	165	124	97	91	92	93
57.5	243	233	203	159	116	90	85	88	89
60	238	228	198	153	108	82	80	83	84
62.5	233	222	192	146	100	75	74	78	79
65	226	216	186	140	92	68	69	73	74
67.5	218	209	179	133	83	61	64	68	69
70	208	199	171	125	74	54	58	62	64
72.5	194	187	163	117	65	48	53	57	58
75	176	171	152	109	56	41	47	51	52
77.5	150	149	137	100	46	35	41	44	45
80	113	117	116	90	37	30	34	37	38
82.5	55	65	85	77	28	24	27	29	29
85	7	7	30	55	18	17	18	18	18
87.5	3	3	3	10	8	9	7	7	7
90	0	0	0	0	0	0	0	0	0

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Luminous Intensity (Candela) Table

Vertical (Gamma) Angles - Data was acquired in 0.5° increments, 2.5° increments shown.	Lateral (C-Plane) Angles								
	0	22.5	45	67.5	90	112.5	135	157.5	180
90	0	0	0	0	0	0	0	0	0
92.5	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0
97.5	0	0	0	0	0	0	0	0	0
100	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	0
107.5	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0
112.5	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0
117.5	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0
122.5	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0
127.5	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0
132.5	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0
137.5	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0
142.5	0	0	0	0	0	0	0	0	0
145	0	0	0	0	0	0	0	0	0
147.5	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0
152.5	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0
157.5	0	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0	0
162.5	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0
167.5	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0
172.5	0	0	0	0	0	0	0	0	0
175	0	0	0	0	0	0	0	0	0
177.5	0	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0	0

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Coefficients of Utilization/Room Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance 0.20

RC	80					70					50				30				10			0
RW	70	50	30	10		70	50	30	10		50	30	10		50	30	10		50	30	10	0
RCR																						
0	119	119	119	119		116	116	116	116		111	111	111		106	106	106		102	102	102	100
1	107	101	96	91		104	99	94	90		94	91	87		90	87	84		87	84	82	80
2	96	86	78	72		93	84	77	71		81	74	69		77	72	68		74	70	66	64
3	86	74	65	58		84	73	64	57		70	62	56		67	61	55		64	59	54	52
4	78	65	55	48		76	64	55	48		61	53	47		59	52	46		57	51	46	43
5	72	58	48	41		70	57	47	40		54	46	40		52	45	40		50	44	39	37
6	66	52	42	35		64	51	42	35		49	41	35		47	40	34		45	39	34	32
7	61	47	37	31		59	46	37	31		44	36	30		43	35	30		41	35	30	28
8	57	42	33	27		55	42	33	27		40	32	27		39	32	27		38	31	26	24
9	53	39	30	24		51	38	30	24		37	29	24		36	29	24		35	28	24	22
10	50	36	27	22		48	35	27	22		34	27	22		33	26	22		32	26	21	20

For absolute test reports, RUs are expressed as a percentage of total lumen output. For relative test reports, CUs are expressed as a percentage of total lamp output. Calculations were based on published IES procedures, and are based on the zonal cavity method. Basic assumptions: 1) Room surfaces are lambertian reflectors. 2) Incident flux on each surface is uniformly distributed. 3) The room is spectrally neutral. When luminaires are not evenly distributed throughout the room, or do not exhibit lateral symmetry, CU values may differ from actual performance.

Circle of Light Plot

Height(ft)	Illuminance at Nadir (fc)	Ground-level distance to half-of-nadir illuminance (ft) 0-180 deg	90-270 deg
6.0	6.0	8.41	7.72
8.0	3.4	11.22	10.30
10.0	2.2	14.02	12.87
12.0	1.5	16.82	15.44
14.0	1.1	19.63	18.02
16.0	0.8	22.43	20.59

Spacing Criterion

0 deg:	1.8
90 deg:	1.3
180 deg:	1.0
270 deg:	1.3

Average Luminance (cd/m^2)

	0 deg Plane	45 deg Plane	90 deg Plane
0	2108	2108	2108
45	3560	3060	2114
55	4227	3549	2121
65	5251	4307	2124
75	6658	5748	2110
85	760	3381	2033

Beam and Field Angle

0-180 Degree Plane

Beam Angle: 116.1°

Field Angle: 166.9°

90-270 Degree Plane

Beam Angle: 106.8°

Field Angle: 165.9°

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UGR Table - Corrected

Reflectances											
Ceiling Cavity		70	70	50	50	30	70	70	50	50	30
Walls		50	30	50	30	30	50	30	50	30	30
Floor Cavity		20	20	20	20	20	20	20	20	20	20
Room Size		UGR Viewed Crosswise					UGR Viewed Endwise				
X=2H	Y=2H	19.1	20.8	19.4	21.2	21.5	14.8	16.5	15.1	16.8	17.1
	3H	22.2	23.8	22.6	24.1	24.5	17.0	18.6	17.3	18.9	19.2
	4H	23.6	25.1	24.0	25.5	25.8	17.9	19.4	18.3	19.7	20.1
	6H	24.7	26.1	25.1	26.5	26.9	18.6	20.0	19.0	20.4	20.8
	8H	24.9	26.3	25.3	26.7	27.1	18.9	20.3	19.3	20.7	21.1
	12H	24.9	26.2	25.4	26.6	27.1	19.1	20.4	19.5	20.8	21.2
4H	2H	19.8	21.3	20.2	21.7	22.0	16.2	17.7	16.6	18.0	18.4
	3H	23.2	24.5	23.6	24.9	25.3	18.7	20.0	19.1	20.4	20.8
	4H	24.8	26.0	25.2	26.4	26.8	19.8	21.0	20.2	21.4	21.8
	6H	26.1	27.1	26.5	27.6	28.0	20.7	21.8	21.2	22.2	22.7
	8H	26.3	27.3	26.8	27.8	28.2	21.1	22.1	21.6	22.5	23.0
	12H	26.4	27.3	26.8	27.7	28.2	21.4	22.3	21.8	22.7	23.2
8H	4H	25.3	26.3	25.7	26.7	27.2	20.9	21.9	21.3	22.3	22.8
	6H	26.7	27.6	27.2	28.0	28.5	22.1	23.0	22.6	23.4	23.9
	8H	27.1	27.8	27.6	28.3	28.8	22.7	23.4	23.2	23.9	24.4
	12H	27.1	27.8	27.6	28.3	28.8	23.1	23.8	23.6	24.3	24.8
12H	4H	25.3	26.2	25.8	26.7	27.2	21.1	22.0	21.6	22.5	22.9
	6H	26.9	27.6	27.4	28.1	28.6	22.5	23.2	23.0	23.7	24.2
	8H	27.3	27.9	27.8	28.4	29.0	23.1	23.8	23.6	24.3	24.8

Maximum UGR = 29.0

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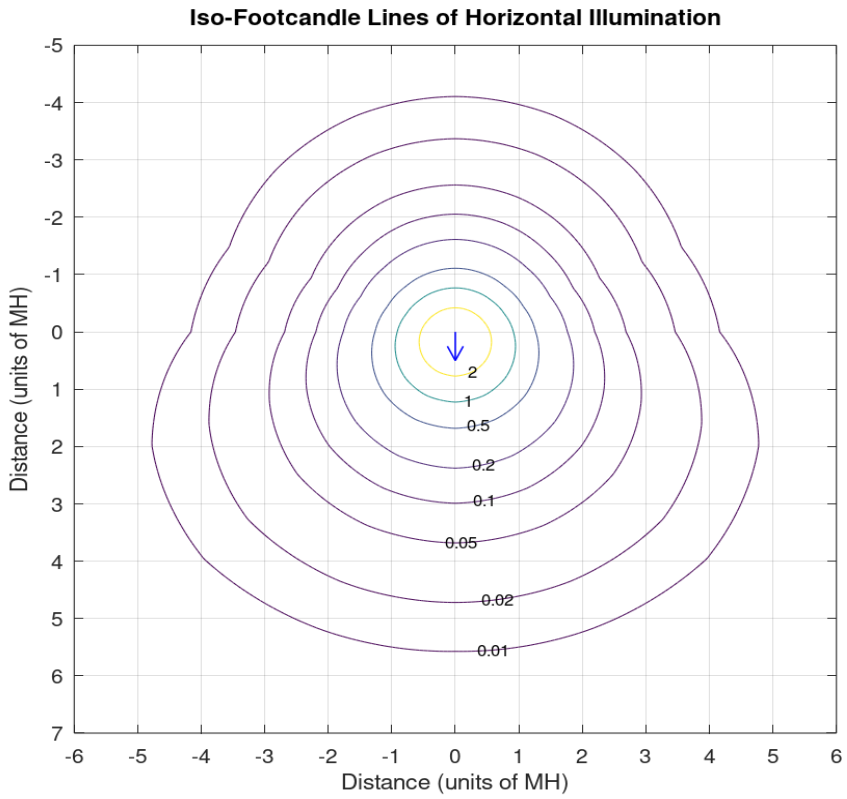
Iso-Illuminance Plot



The isofootcandle values shown in the plot above are based on a mounting height of h = 8.0 feet. Grid values show multiples of mounting height. The isoilluminance contour lines are expressed in units of footcandles. The values expressed are based on the direct light from a single unit without the contribution of room reflections.

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Additional Pictures of Test Subject

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Test Distance	9.5 m
Ambient Temperature	24.9 °C

Notes

The laboratory has not participated in 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.

Tested in accordance with the applicable sections of IES LM-79-19. Format of reports and angular increments based on IES LM-41-20 and LM-46-20.

The luminous intensity values, and other derived quantities, contained in this report are based on the absolute data, as measured.

Prorating the performance of the sample for the use of other component combinations (such as lamp / LED / Ballast / driver), 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 C-Gamma coordinate system as defined in CIE publication number 121.

This report may contain data that are not covered by the NVLAP accreditation. Quantities marked with ‡ are not covered.

This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Report of Test

LLIA001607-003B

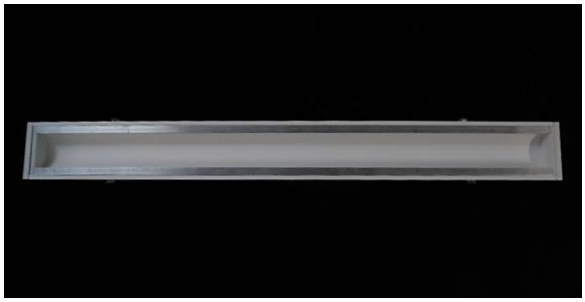
Integrating Sphere Report

Catalog Number: ARR-ASYM-MO-K40-80-4-XX-120-DIM1

Recessed mounted, aluminum housing, steel end caps, aluminum reflector/LED holder and white painted ends, white plastic reflector sheet, open bottom.

One energized row of 184 white LEDs aimed up with one-piece diffuse plastic lens above LEDs

One Osram OTi30/120-277/1A0DIM-1LG2 LED driver labeled as 200mA



Performance Summary

Voltage	120.0	Vac
Current	0.0739	A
Power	8.14	W
Frequency	59.99	Hz
Power Factor	0.918	
Current THD	20.5	%
Total Luminous Flux	803.1	lm
Efficacy	98.7	lm/W
Chromaticity (x,y)	(0.3861, 0.3851)	
(u',v')	(0.2255, 0.5060)	
Duv	0.0023	
CCT	3913	K
CRI (Ra)	83	
R9	9	
TM-30: Rf	82	
TM-30: Rg	94	
TM-30: Rcs,h1	-12	

Prepared For:
Precision Architectural Lighting
4830 Timber Creek Drive
Houston, TX 77017, USA

Test date: 12/14/2021
Report date: 12/16/2021

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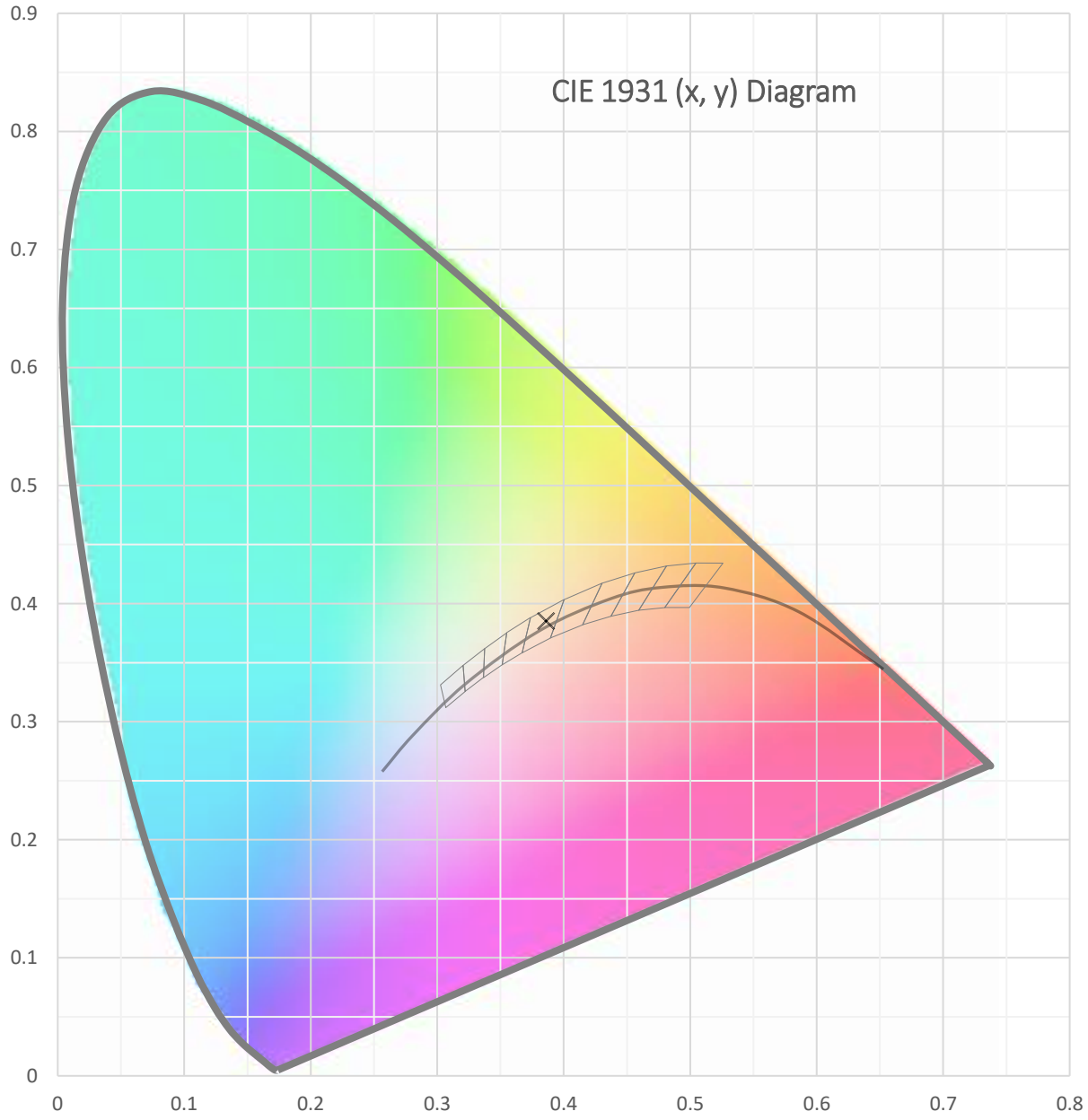
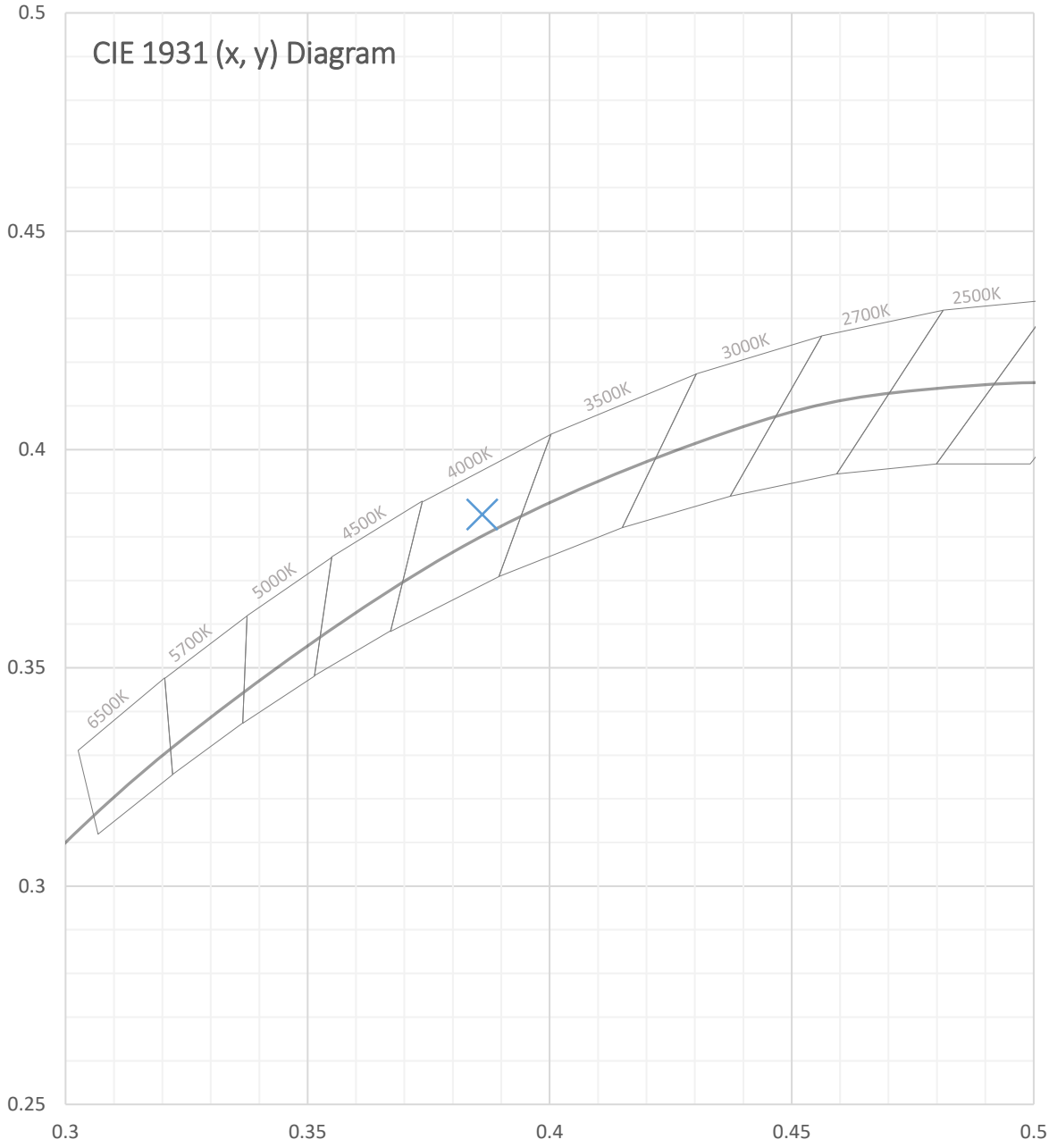


Test Report Number: LLIA001607-003B



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Total Radiant Flux	2.426	W
Total Luminous Flux	803.1	Lm
Chromaticity CIE 1931 (x, y)	(0.3861, 0.3851)	
Chromaticity CIE 1976 (u', v')	(0.2255, 0.5060)	
Correlated Color Temperature (CCT)	3913	K
Color Rendering Index (Ra)	83	
R1	82	
R2	90	
R3	96	
R4	81	
R5	81	
R6	87	
R7	86	
R8	64	
R9	9	
R10	77	
R11	81	
R12	60	
R13	84	
R14	98	
TM-30: Rf	82	
TM-30: Rg	94	
TM-30: Rcs,h1	-12	
Distance from Planckian Locus (Duv)	0.0023	
Scotopic/Photopic Ratio ǂ	1.678	

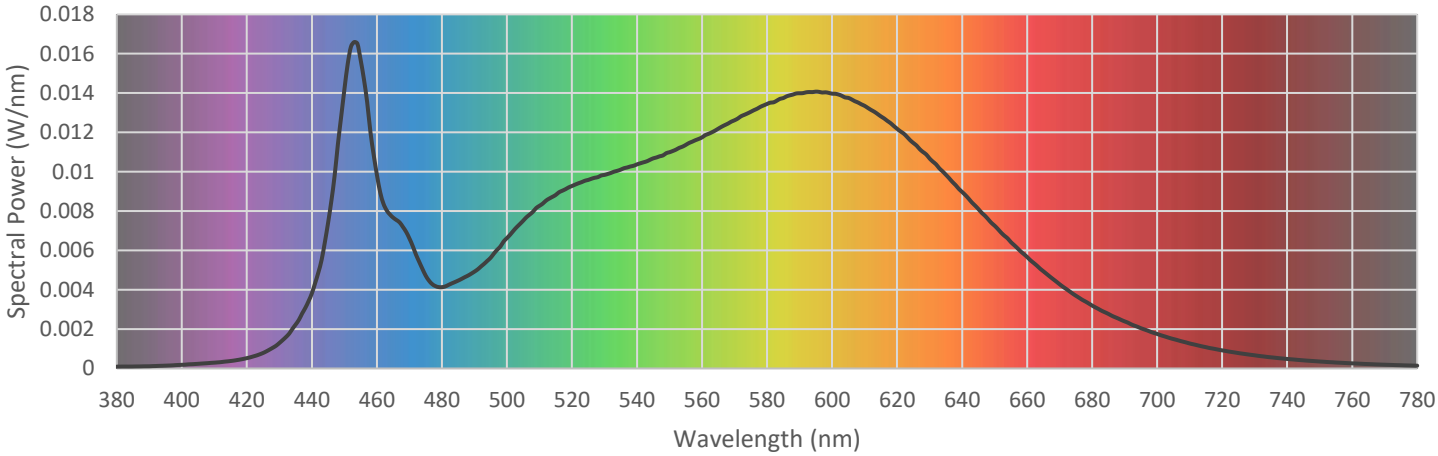
Electrical Data

Voltage	120.0	Vac
Current	0.0739	A
Power	8.14	W
Frequency	59.99	Hz
Power Factor	0.918	
Current THD	20.5	%

Test Report Number: LLIA001607-003B

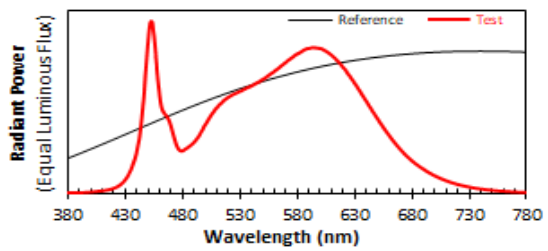
Summary Spectral Power Distribution (wavelength - nm, spectral power - W/nm)

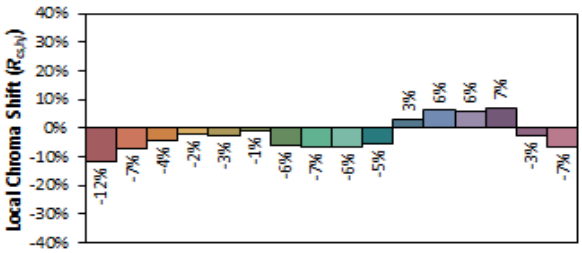
380	0.000094	480	0.004134	580	0.013446	680	0.003198
385	0.000099	485	0.004467	585	0.013745	685	0.002774
390	0.000112	490	0.004921	590	0.013990	690	0.002394
395	0.000144	495	0.005630	595	0.014071	695	0.002045
400	0.000185	500	0.006628	600	0.013968	700	0.001755
405	0.000237	505	0.007512	605	0.013755	705	0.001495
410	0.000295	510	0.008268	610	0.013352	710	0.001271
415	0.000379	515	0.008820	615	0.012816	715	0.001083
420	0.000525	520	0.009275	620	0.012186	720	0.000920
425	0.000789	525	0.009585	625	0.011464	725	0.000783
430	0.001295	530	0.009839	630	0.010675	730	0.000669
435	0.002233	535	0.010107	635	0.009850	735	0.000566
440	0.003821	540	0.010375	640	0.008974	740	0.000484
445	0.007425	545	0.010681	645	0.008107	745	0.000413
450	0.014181	550	0.010992	650	0.007258	750	0.000353
455	0.015680	555	0.011365	655	0.006425	755	0.000302
460	0.009842	560	0.011746	660	0.005667	760	0.000260
465	0.007666	565	0.012188	665	0.004940	765	0.000223
470	0.006610	570	0.012617	670	0.004281	770	0.000190
475	0.004720	575	0.013047	675	0.003698	775	0.000164
						780	0.000141

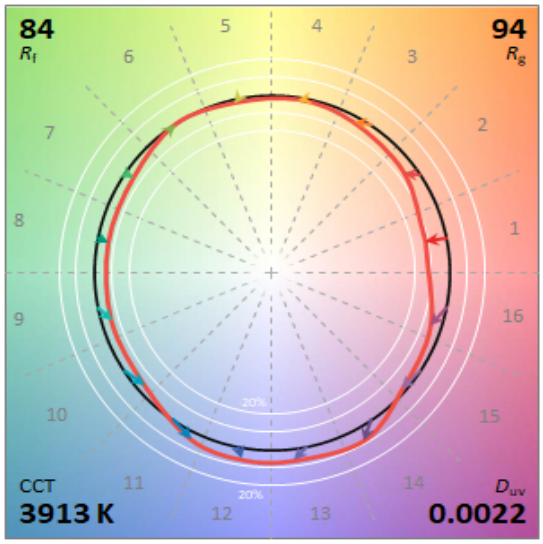


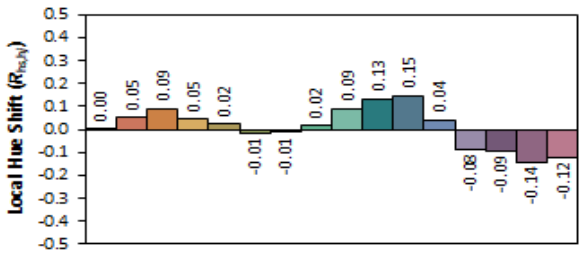
Test Report Number: LLIA001607-003B

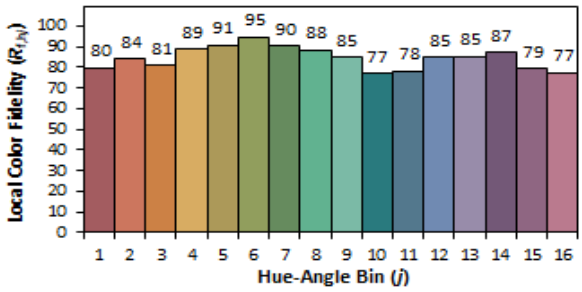
IES TM-30 Details

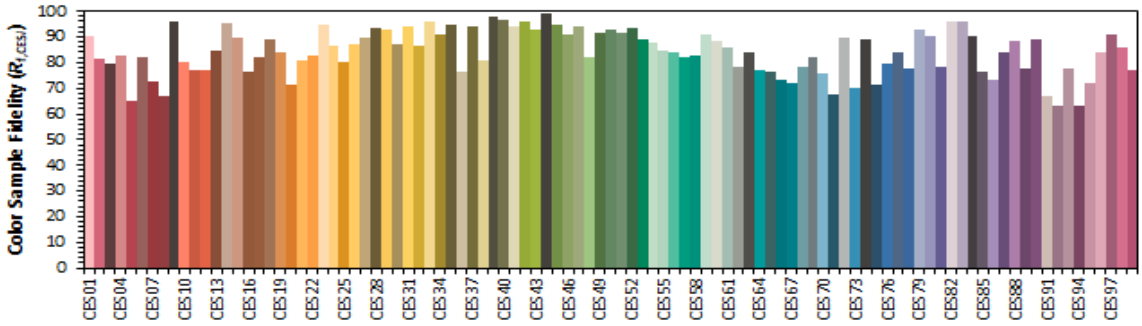












Notes:

x	0.3861
y	0.3850
u'	0.2255
v'	0.5060

CIE 13.3-1995 (CRI)

R_a	83
R_9	9

Test Report Number: LLIA001607-003B

Test Equipment Configuration:	LightLab International Allentown 2m Integrating Sphere Measurements acquired using a Labsphere CDS 2600 spectroradiometer Testing was performed using 4π geometry
Test Temperature:	25.3 °C
Test Procedure:	Tested in accordance with the applicable sections of: LM-79-19, LM-78-20, LM-58-20, ANSI_ANSLG C78.377-2017, TM-30-20
Significance:	The laboratory has not participated in 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.
Notes:	The measurements and other derived quantities contained in this report are based on the absolute data as measured. Prorating the performance of the sample for the use of other component combinations (such as lamp / LED / Ballast / driver), or for use in different environmental conditions than that tested, may produce erroneous results. This report is free of erasures and corrections This report may contain data that are not covered by the NVLAP accreditation. Quantities marked with ǂ are not covered. This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the Federal Government.

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