LightLab INTERNATIONAL ALLENTOWN LLC

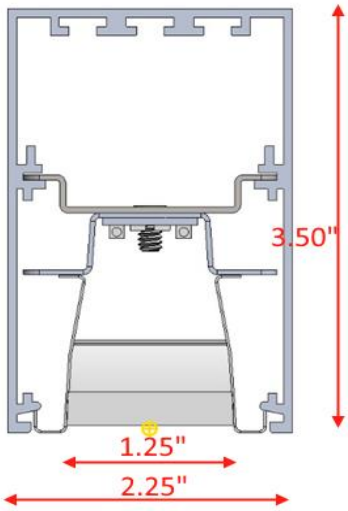
NVLAP TESTING Lab Code: 201079-0

Report of Test

LLIA001357-005A

Indoor Distribution Photometry Test Report

Catalog Number: QS2-D-HO-K40-80-4-XX-PBF01M-FXXX-UNV-DIM1
Pendant mounted, extruded aluminum housing, white enamel aluminum LED tray,
formed white enamel aluminum baffle with frosted plastic insert.
128 white LEDs, two PAL 6000201 rev1 LED boards with 64 LEDs each.
One Osram Optotronic OTi 30/120-277/1A0 DIM-1 L G2 LED driver labeled as 1240mA



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

Performance Summary					
Input Voltage	120.0	V	Luminous Flux	2710.4	Lumens
Input Current	0.2767	A	Total Efficacy	83.4	Lm/W
Input Power	32.48	W	Downward Flux	2710.4	Lumens
Frequency	60.00	Hz	Downward Flux	100.0	% of Total
Power Factor	0.978				
Current THD	10.5	%			

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

Test date: 12/08/2020
Report date: 12/14/2020

Signed: Michael L. Grather

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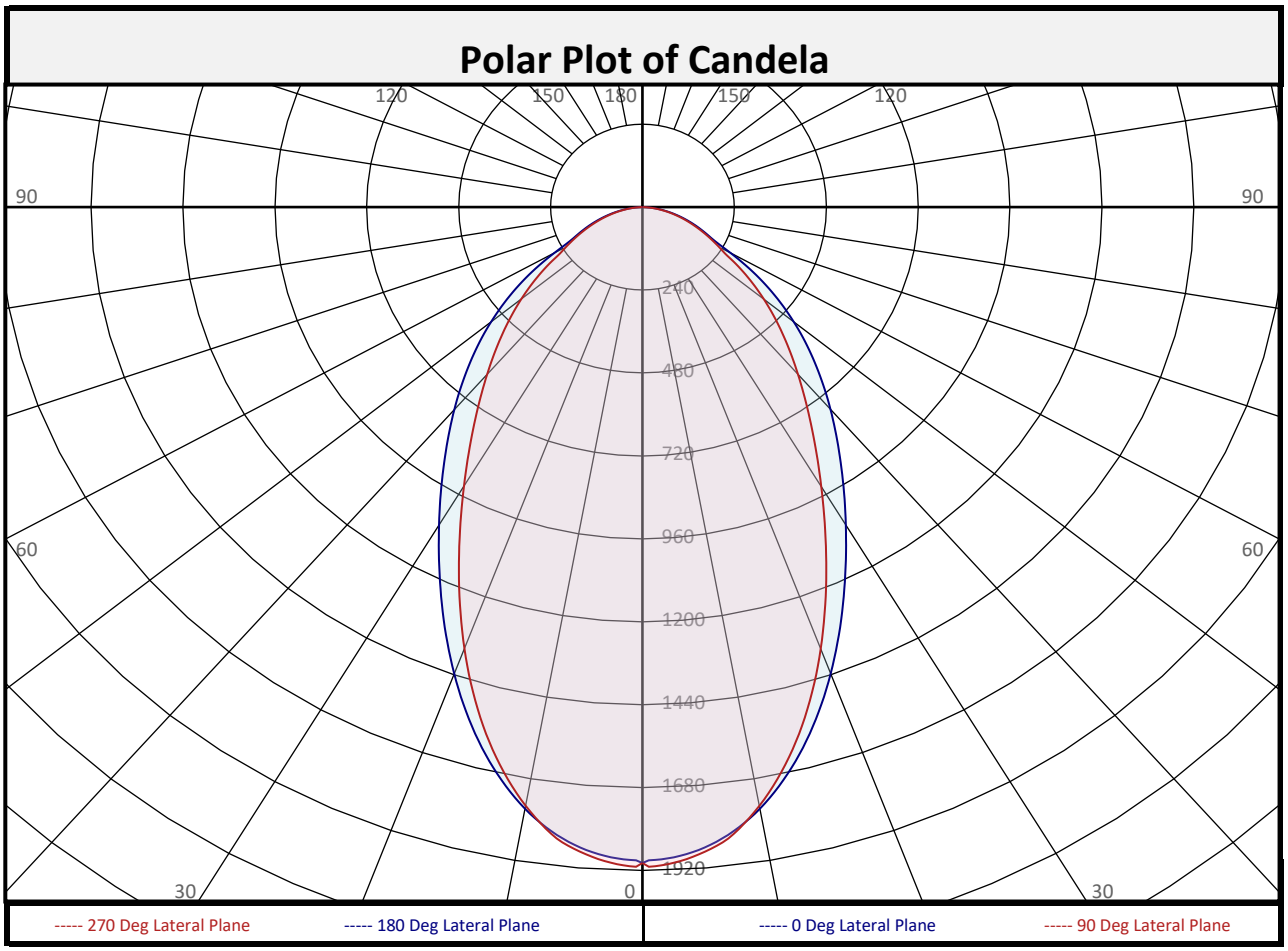

Zonal Flux Summary									
Zone (Deg Vert)	Flux (Lumens)	Percent of Total	Zone (Deg Vert)	Flux (Lumens)	Percent of Total	Zone (Deg Vert)	Flux (Lumens)	Percent of Total
0-10	175.0	6.5%	90-100	0.0	0.0%	0-20	621.6	22.9%
10-20	446.6	16.5%	100-110	0.0	0.0%	0-30	1166	43.0%
20-30	544.5	20.1%	110-120	0.0	0.0%	0-40	1676	61.8%
30-40	510.3	18.8%	120-130	0.0	0.0%	0-60	2405	88.7%
40-50	423.8	15.6%	130-140	0.0	0.0%	0-80	2685	99.1%
50-60	304.9	11.2%	140-150	0.0	0.0%	10-90	2535	93.5%
60-70	182.0	6.7%	150-160	0.0	0.0%	20-50	1479	54.6%
70-80	98.2	3.6%	160-170	0.0	0.0%	40-90	1034	38.1%
80-90	25.2	0.9%	170-180	0.0	0.0%	60-90	305.4	11.3%
0-90	2710	100.0%	90-180	0.0	0.0%	0-180	2710	100.0%

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Luminous Intensity (Candela) Table

	Lateral (C-Plane) Angles									
Vertical (Gamma) Angles		0	22.5	45	67.5	90	112.5	135	157.5	180
	0	1898	1898	1898	1898	1898	1898	1898	1898	1898
	2.5	1884	1883	1888	1896	1899	1896	1888	1883	1884
	5	1861	1859	1863	1870	1873	1870	1863	1859	1861
	7.5	1822	1820	1823	1830	1829	1830	1823	1820	1822
	10	1768	1765	1769	1763	1759	1763	1769	1765	1768
	12.5	1699	1696	1692	1682	1675	1682	1692	1696	1699
	15	1620	1617	1603	1589	1579	1589	1603	1617	1620
	17.5	1531	1528	1504	1485	1472	1485	1504	1528	1531
	20	1437	1430	1400	1375	1360	1375	1400	1430	1437
	22.5	1340	1327	1292	1262	1246	1262	1292	1327	1340
	25	1244	1224	1184	1150	1135	1150	1184	1224	1244
	27.5	1151	1125	1079	1043	1030	1043	1079	1125	1151
	30	1062	1029	978	942	933	942	978	1029	1062
	32.5	980	939	884	851	845	851	884	939	980
	35	903	856	798	768	766	768	798	856	903
	37.5	831	780	719	694	696	694	719	780	831
	40	764	708	648	626	631	626	648	708	764
	42.5	699	643	583	566	572	566	583	643	699
	45	637	581	525	510	516	510	525	581	637
	47.5	576	523	471	458	463	458	471	523	576
	50	515	468	422	409	412	409	422	468	515
	52.5	454	414	375	362	362	362	375	414	454
	55	393	363	331	316	313	316	331	363	393
	57.5	331	312	290	273	263	273	290	312	331
	60	266	263	251	231	230	231	251	263	266
	62.5	214	216	214	203	203	203	214	216	214
	65	185	182	181	178	177	178	181	182	185
	67.5	162	158	155	154	154	154	155	158	162
	70	139	136	132	132	131	132	132	136	139
	72.5	118	115	111	111	110	111	111	115	118
	75	97	94	91	91	90	91	91	94	97
	77.5	77	75	72	72	71	72	72	75	77
	80	58	56	54	54	53	54	54	56	58
	82.5	40	38	37	37	37	37	37	38	40
	85	22	22	21	21	21	21	21	22	22
	87.5	7	7	8	8	7	8	8	7	7
	90	0	0	0	0	0	0	0	0	0

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Luminous Intensity (Candela) Table

	Lateral (C-Plane) Angles									
Vertical (Gamma) 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	111	107	103	100		108	105	101	99		100	98	95		97	95	93		93	91	90	88
2	103	96	90	85		100	94	89	84		91	86	82		87	84	81		84	81	79	77
3	95	86	79	74		93	85	78	73		82	76	72		79	75	71		77	73	70	68
4	88	78	71	65		86	77	70	64		74	68	64		72	67	63		70	66	62	60
5	82	71	63	58		80	70	63	57		68	62	57		66	61	56		65	60	56	54
6	77	65	57	52		75	64	57	52		63	56	51		61	55	51		60	54	50	49
7	72	60	52	47		70	59	52	47		58	51	47		57	51	46		55	50	46	44
8	68	56	48	43		66	55	48	43		54	47	43		53	47	42		51	46	42	40
9	64	52	44	39		62	51	44	39		50	44	39		49	43	39		48	43	39	37
10	60	48	41	36		59	48	41	36		47	41	36		46	40	36		45	40	36	34

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	52.7	5.48	5.12
8.0	29.7	7.31	6.82
10.0	19.0	9.13	8.53
12.0	13.2	10.96	10.23
14.0	9.7	12.79	11.94
16.0	7.4	14.61	13.65

Average Luminance (cd/m^2)

	0 deg Plane	45 deg Plane	90 deg Plane
0	50352	50352	50352
45	23876	19694	19357
55	18184	15309	14497
65	11632	11383	11127
75	9917	9374	9237
85	6827	6436	6495

Spacing Criterion

0 degree plane:	0.9
90 degree plane:	0.9
180 degree plane:	0.9
270 degree plane:	0.9

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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	20.7	22.2	21.1	22.5	22.8	19.7	21.1	20.0	21.4	21.7
	3H	21.9	23.2	22.3	23.5	23.8	21.1	22.4	21.5	22.7	23.1
	4H	22.4	23.5	22.8	23.9	24.3	21.6	22.8	22.0	23.2	23.5
	6H	22.7	23.8	23.1	24.2	24.6	22.0	23.1	22.4	23.5	23.8
	8H	22.8	23.8	23.2	24.2	24.6	22.1	23.1	22.5	23.5	23.9
	12H	22.9	23.9	23.3	24.2	24.7	22.2	23.2	22.6	23.5	24.0
4H	2H	21.1	22.2	21.5	22.6	23.0	20.2	21.4	20.6	21.7	22.1
	3H	22.4	23.4	22.8	23.8	24.2	21.8	22.8	22.2	23.2	23.6
	4H	23.0	23.9	23.4	24.3	24.8	22.4	23.3	22.9	23.7	24.2
	6H	23.5	24.3	24.0	24.7	25.2	22.9	23.7	23.4	24.2	24.6
	8H	23.6	24.4	24.1	24.8	25.3	23.1	23.8	23.5	24.3	24.7
	12H	23.7	24.4	24.2	24.9	25.3	23.2	23.8	23.7	24.3	24.8
8H	4H	23.2	23.9	23.7	24.4	24.8	22.7	23.4	23.1	23.8	24.3
	6H	23.8	24.4	24.3	24.9	25.3	23.3	23.9	23.8	24.4	24.8
	8H	24.0	24.5	24.5	25.0	25.5	23.5	24.0	24.0	24.5	25.0
	12H	24.1	24.6	24.7	25.1	25.7	23.7	24.1	24.2	24.6	25.2
12H	4H	23.2	23.8	23.7	24.3	24.8	22.7	23.3	23.2	23.8	24.3
	6H	23.8	24.3	24.3	24.8	25.4	23.3	23.9	23.9	24.3	24.9
	8H	24.1	24.5	24.6	25.0	25.6	23.6	24.0	24.1	24.5	25.1

Maximum UGR = 25.7

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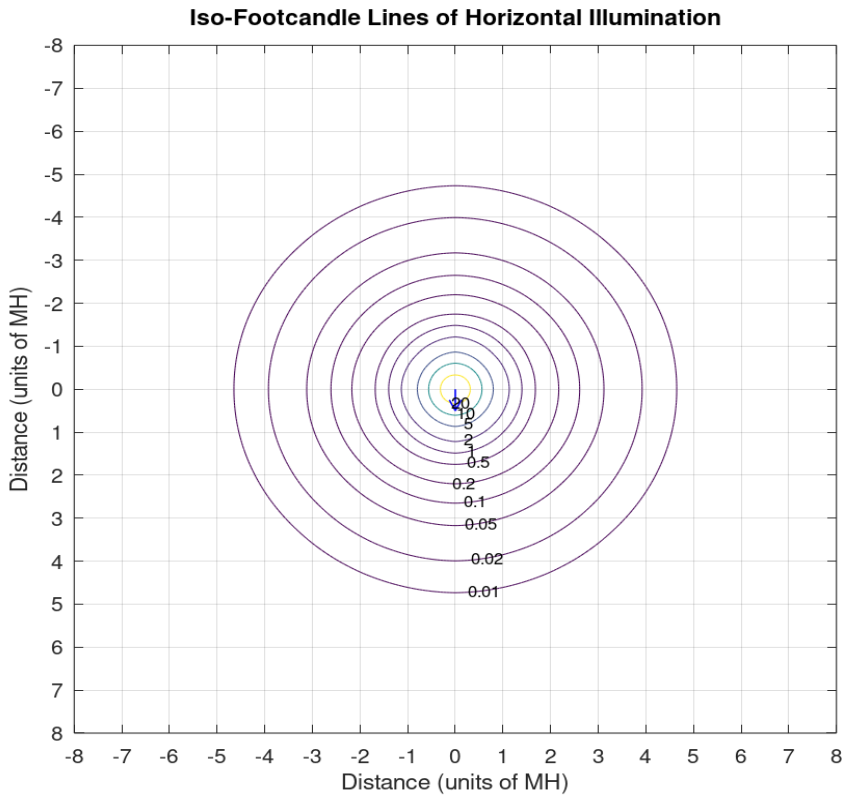
Iso-Illuminance Plot



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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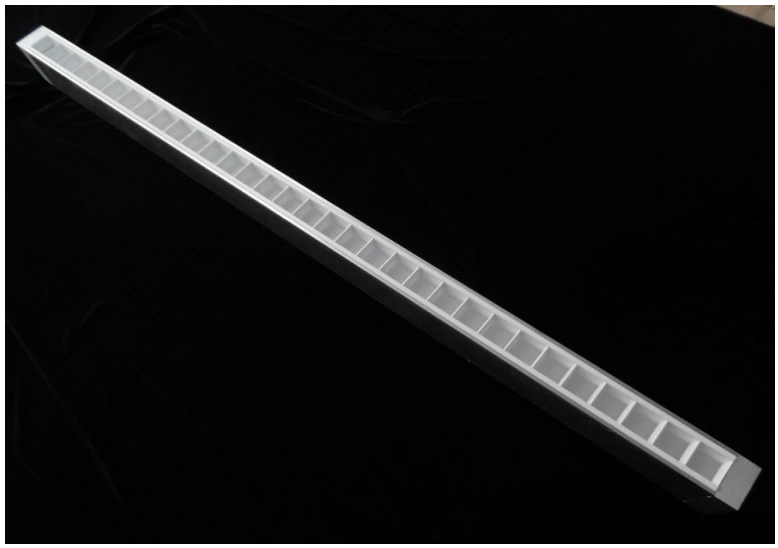
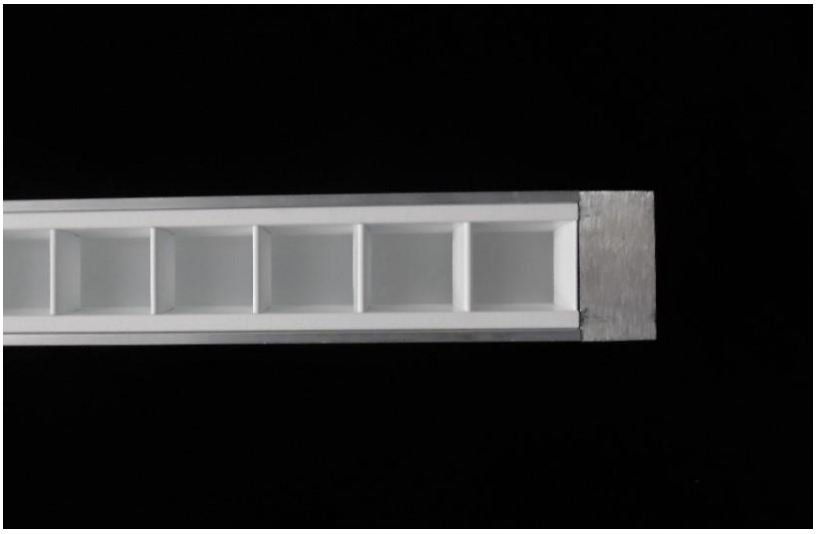
Additional Pictures of Test Subject





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Test Distance	9.5 m
Ambient Temperature	25.0 °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-41-14 and LM-46-04.

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.

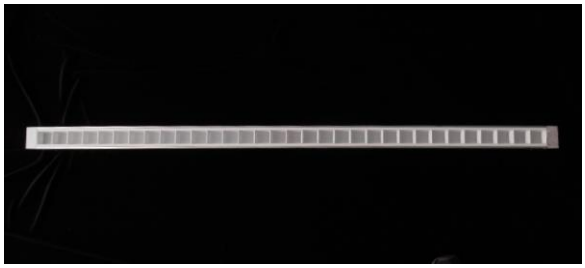
LightLab INTERNATIONAL ALLENTOWN LLC

NVLAP TESTING Lab Code: 201079-0

Report of Test

LLIA001357-005B

Integrating Sphere Report
Catalog Number: QS2-D-HO-K40-80-4-XX-PBF01M-FXXX-UNV-DIM1
Pendant mounted, extruded aluminum housing, white enamel aluminum LED tray,
formed white enamel aluminum baffle with frosted plastic insert.
128 white LEDs, two PAL 6000201 rev1 LED boards with 64 LEDs each.
One Osram Optotronic OTi 30/120-277/1A0 DIM-1 L G2 LED driver labeled as 1240mA



Performance Summary

Voltage	120.0	Vac
Current	0.2760	A
Power	32.49	W
Frequency	59.99	Hz
Power Factor	0.981	
Current THD	10.5	%
Total Luminous Flux	2753.2	lm
Efficacy	84.7	lm/W
Chromaticity (x,y)	(0.3794, 0.3810)	
(u',v')	(0.2227, 0.5033)	
Duv	0.0023	
CCT	4059	K
CRI (Ra)	82	
R9	4	
TM-30: Rf	81	
TM-30: Rg	93	
TM-30: Rcs,h1	-13	

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

Test date: 12/09/2020
Report date: 12/14/2020

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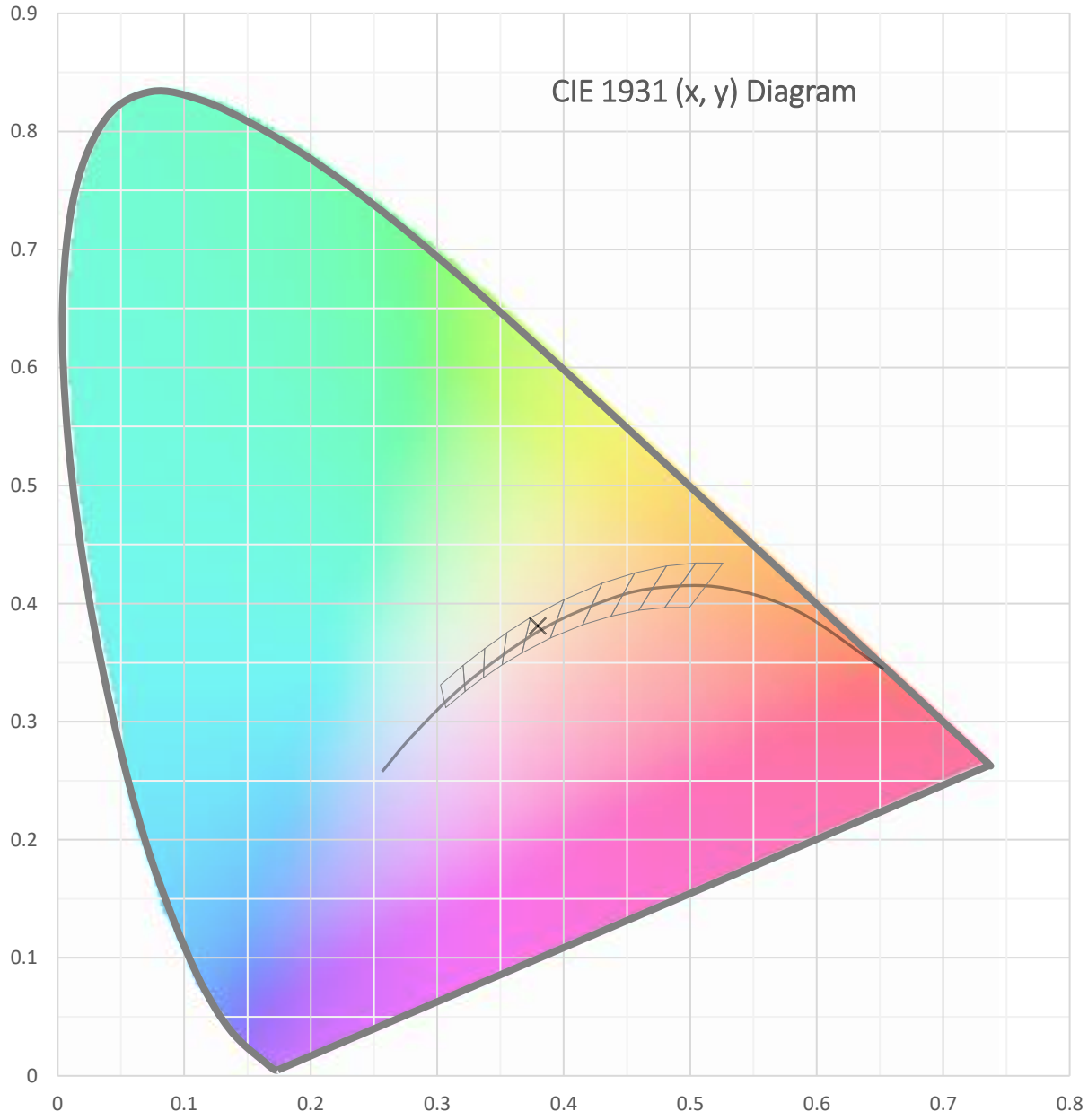
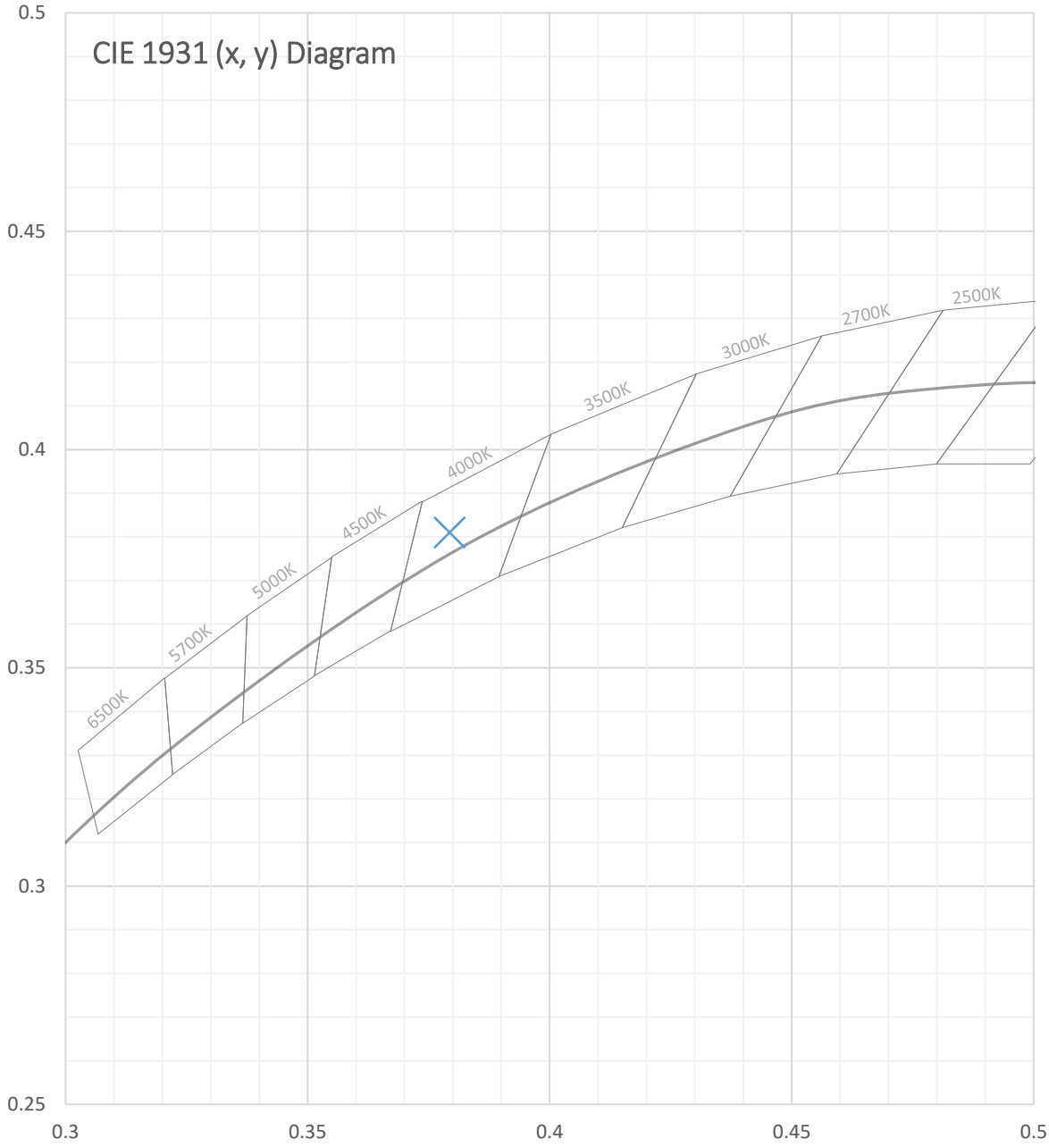


Test Report Number: LLIA001357-005B



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Total Radiant Flux	8.311	W
Total Luminous Flux	2753.2	Lm
Chromaticity CIE 1931 (x, y)	(0.3794, 0.3810)	
Chromaticity CIE 1976 (u', v')	(0.2227, 0.5033)	
Correlated Color Temperature (CCT)	4059	K
Color Rendering Index (Ra)	82	
R1	80	
R2	90	
R3	96	
R4	80	
R5	80	
R6	86	
R7	85	
R8	62	
R9	4	
R10	76	
R11	78	
R12	59	
R13	83	
R14	98	
TM-30: Rf	81	
TM-30: Rg	93	
TM-30: Rcs,h1	-13	
Distance from Planckian Locus (Duv)	0.0023	
Scotopic/Photopic Ratio ǂ	1.718	

Electrical Data

Voltage	120.0	Vac
Current	0.2760	A
Power	32.49	W
Frequency	59.99	Hz
Power Factor	0.981	
Current THD	10.5	%

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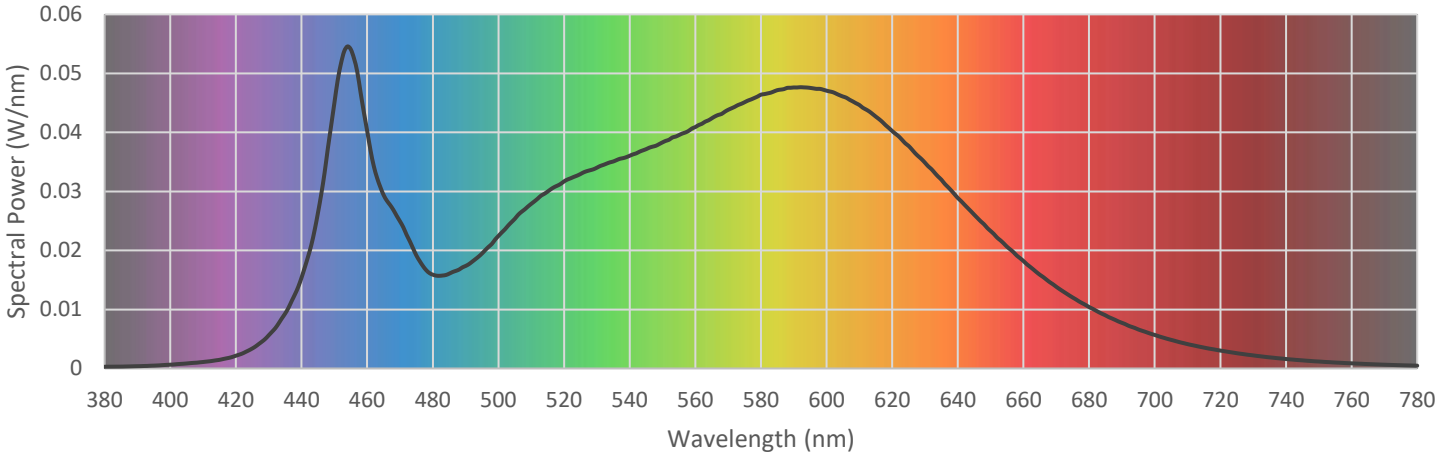
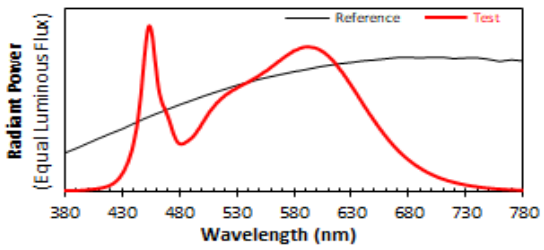
Summary Spectral Power Distribution (wavelength - nm, spectral power - W/nm)

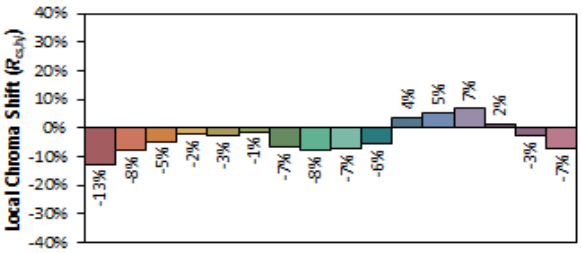
380	0.000294	480	0.015893	580	0.046392	680	0.010407
385	0.000313	485	0.016067	585	0.047158	685	0.008999
390	0.000387	490	0.017369	590	0.047616	690	0.007736
395	0.000484	495	0.019482	595	0.047541	695	0.006610
400	0.000640	500	0.022456	600	0.047068	700	0.005679
405	0.000850	505	0.025360	605	0.046076	705	0.004848
410	0.001098	510	0.027898	610	0.044642	710	0.004126
415	0.001462	515	0.029976	615	0.042673	715	0.003538
420	0.002164	520	0.031697	620	0.040228	720	0.003032
425	0.003392	525	0.032948	625	0.037711	725	0.002587
430	0.005628	530	0.034019	630	0.034858	730	0.002219
435	0.009300	535	0.035072	635	0.031979	735	0.001881
440	0.015403	540	0.036041	640	0.028880	740	0.001603
445	0.026380	545	0.037157	645	0.026048	745	0.001373
450	0.044962	550	0.038310	650	0.023290	750	0.001177
455	0.054073	555	0.039539	655	0.020615	755	0.001007
460	0.040232	560	0.040903	660	0.018202	760	0.000870
465	0.029390	565	0.042382	665	0.015879	765	0.000745
470	0.024927	570	0.043822	670	0.013845	770	0.000637
475	0.019137	575	0.045108	675	0.012023	775	0.000551
						780	0.000475

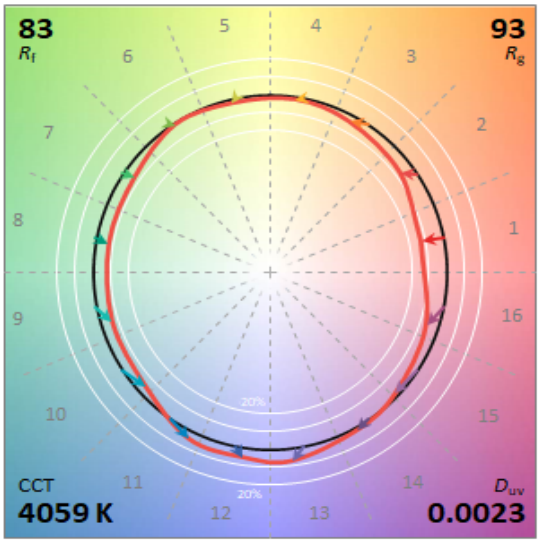


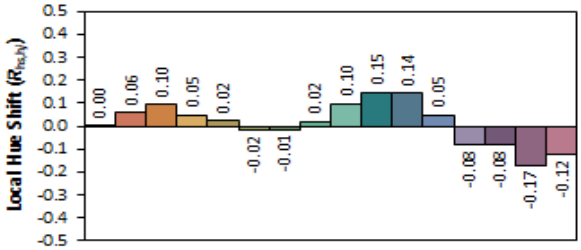
Test Report Number: LLIA001357-005B

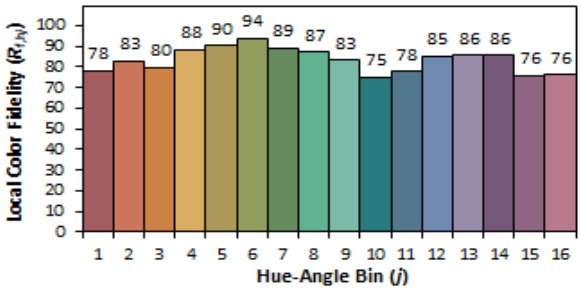
IES TM-30 Details

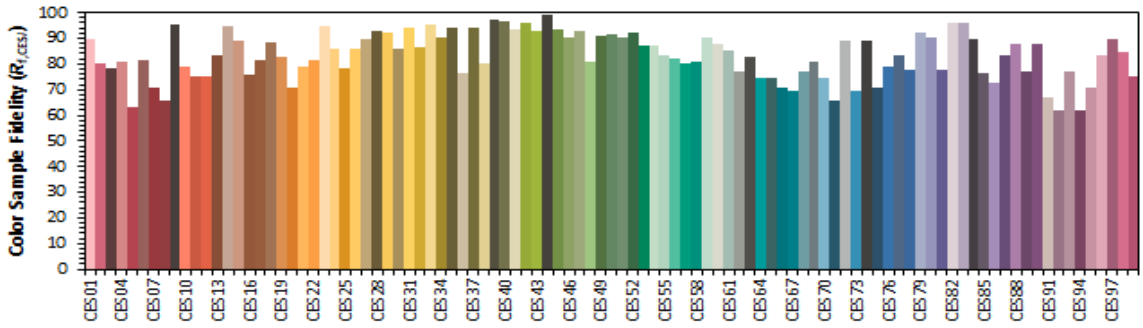












Notes:

x	0.3794
y	0.3809
u'	0.2228
v'	0.5032

CIE 13.3-1995 (CRI)

R_a	82
R_9	4

Test Report Number: LLIA001357-005B

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:	24.5 °C
Test Procedure:	Tested in accordance with the applicable sections of: LM-79-19, LM-78-07, LM-58-13, ANSI_ANSLG C78.377-2017, TM-30-18
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 ‡ 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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