LightLab INTERNATIONAL ALLENTOWN LLC

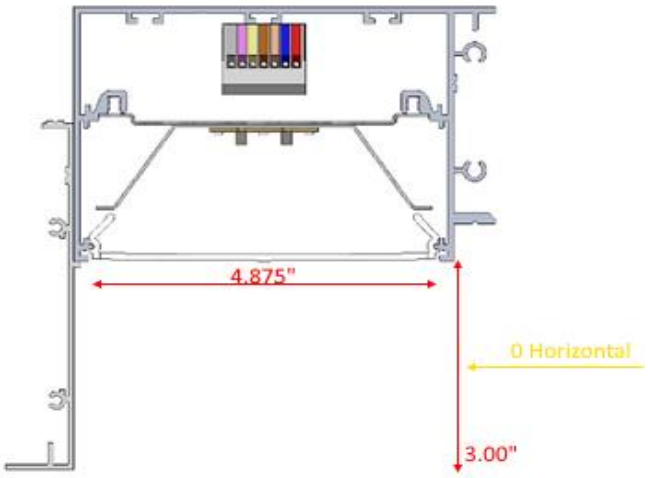
NVLAP TESTING Lab Code: 201079-0

Report of Test

LLIA001329-010A

Indoor Distribution Photometry Test Report

Catalog Number: PS5-A-MO-K35-80-4-XX-WTR-LOH-XXXV
Recessed mounted, extruded aluminum housing, formed
white enamel aluminum LED tray, translucent white plastic enclosure.
144 white LEDs, two Osram PrevaLED Bars with 72 LEDs each.
One Osram Optotronic OTi 20/120-277/700 DIM-1 L G2LED driver labeled as 480mA



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

Performance Summary					
Input Voltage	120.0	V	Luminous Flux	2054.6	Lumens
Input Current	0.1538	A	Total Efficacy	112.4	Lm/W
Input Power	18.28	W	Downward Flux	2003.0	Lumens
Frequency	60.00	Hz	Downward Flux	97.5	% of Total
Power Factor	0.991				
Current THD	6.1	%			

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

Test date: 10/13/2020
Report date: 10/14/2020

Signed: Michael L. Grather

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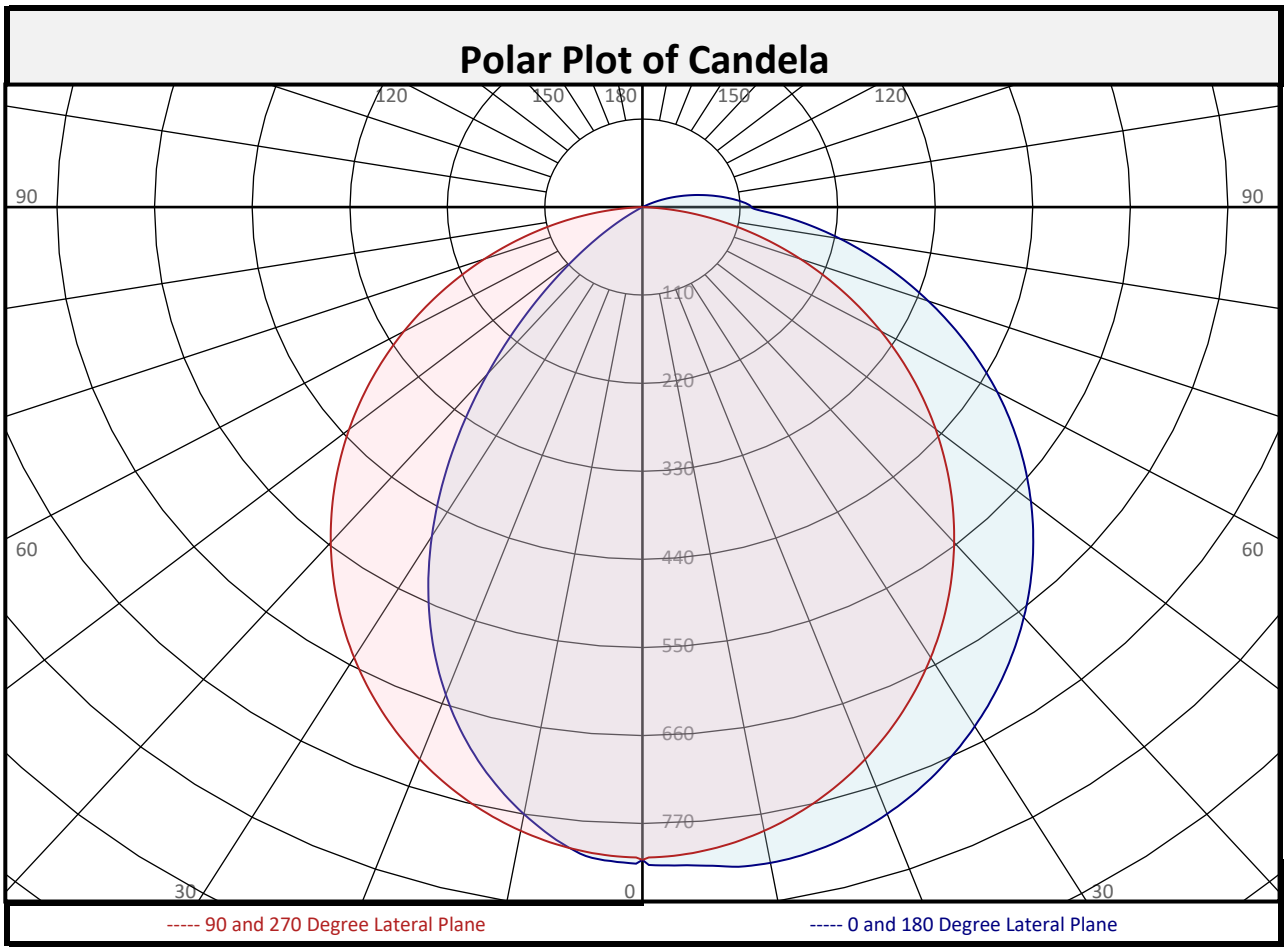

Zonal Flux Summary									
Zone (Deg Vert)	Flux (Lumens)	Percent of Total	Zone (Deg Vert)	Flux (Lumens)	Percent of Total	Zone (Deg Vert)	Flux (Lumens)	Percent of Total
0-10	77.0	3.7%	90-100	32.9	1.6%	0-20	293.5	14.3%
10-20	216.5	10.5%	100-110	14.7	0.7%	0-30	609.0	29.6%
20-30	315.5	15.4%	110-120	3.2	0.2%	0-40	966.8	47.1%
30-40	357.9	17.4%	120-130	0.6	0.0%	0-60	1592	77.5%
40-50	342.1	16.7%	130-140	0.2	0.0%	0-80	1935	94.2%
50-60	283.4	13.8%	140-150	0.0	0.0%	10-90	1926	93.7%
60-70	207.7	10.1%	150-160	0.0	0.0%	20-50	1015	49.4%
70-80	134.5	6.5%	160-170	0.0	0.0%	40-90	1036	50.4%
80-90	68.4	3.3%	170-180	0.0	0.0%	60-90	410.6	20.0%
0-90	2003	97.5%	90-180	51.6	2.5%	0-180	2055	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	815	815	815	815	815	815	815	815	815
	2.5	823	820	815	812	811	810	812	815	818
	5	826	821	814	809	807	806	807	810	811
	7.5	831	825	813	804	800	799	796	793	792
	10	832	826	813	797	791	789	779	772	770
	12.5	829	823	809	789	780	776	759	748	744
	15	824	817	802	780	767	759	736	721	716
	17.5	816	809	792	769	751	739	711	691	684
	20	807	799	780	756	734	717	683	658	648
	22.5	795	787	766	741	715	693	653	622	610
	25	781	772	751	723	695	668	621	583	568
	27.5	766	757	733	704	673	641	587	541	523
	30	749	739	715	684	650	613	550	497	475
	32.5	731	721	695	662	626	583	513	450	425
	35	711	700	673	639	600	553	473	402	374
	37.5	691	679	651	615	574	521	432	353	322
	40	669	657	627	590	547	488	390	303	271
	42.5	646	634	603	564	519	455	347	255	223
	45	622	610	578	538	490	422	303	208	177
	47.5	598	585	553	511	461	387	259	165	135
	50	572	559	527	484	432	352	216	125	98
	52.5	545	532	500	455	402	316	175	90	66
	55	518	505	472	427	371	280	136	60	39
	57.5	490	478	445	399	341	244	101	35	17
	60	462	449	417	370	311	207	69	13	0
	62.5	433	420	388	341	280	171	43	2	0
	65	403	391	360	313	250	135	21	2	0
	67.5	373	361	331	284	219	100	5	2	0
	70	343	332	302	256	190	69	4	1	0
	72.5	313	302	272	228	160	41	3	1	0
	75	284	273	243	200	132	20	3	1	0
	77.5	255	244	214	172	104	5	2	0	0
	80	226	216	187	144	77	4	2	0	0
	82.5	198	188	160	116	51	3	0	0	0
	85	169	160	133	90	26	2	0	0	0
	87.5	141	132	106	66	8	0	0	0	0
	90	123	114	86	43	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	123	114	86	43	0	0	0	0	0
	92.5	116	107	78	35	0	0	0	0	0
	95	105	96	68	26	0	0	0	0	0
	97.5	94	85	57	18	0	0	0	0	0
	100	82	73	46	10	0	0	0	0	0
	102.5	70	61	36	5	0	0	0	0	0
	105	58	50	26	4	0	0	0	0	0
	107.5	47	39	17	3	0	0	0	0	0
	110	36	29	8	3	0	0	0	0	0
	112.5	25	19	4	2	0	0	0	0	0
	115	15	10	3	2	0	0	0	0	0
	117.5	6	2	3	2	0	0	0	0	0
	120	0	2	3	2	0	0	0	0	0
	122.5	0	2	2	2	0	0	0	0	0
	125	0	1	2	1	0	0	0	0	0
	127.5	0	1	2	1	0	0	0	0	0
	130	0	1	2	1	0	0	0	0	0
	132.5	0	1	2	1	0	0	0	0	0
	135	0	0	1	0	0	0	0	0	0
	137.5	0	0	1	0	0	0	0	0	0
	140	0	0	1	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	118	118	118	118		115	115	115	115		110	110	110		105	105	105		100	100	100	97
1	108	103	99	95		105	101	97	93		96	93	90		91	89	86		87	85	83	81
2	98	90	83	78		96	88	82	77		84	79	74		81	76	72		77	74	70	68
3	90	80	72	65		87	78	70	64		75	68	63		71	66	62		69	64	60	58
4	83	71	62	56		80	69	61	55		67	60	54		64	58	53		62	56	52	50
5	76	64	55	48		74	62	54	48		60	53	47		58	51	47		56	50	46	44
6	71	58	49	43		69	57	48	42		54	47	42		53	46	41		51	45	41	39
7	66	52	44	38		64	52	43	38		50	42	37		48	42	37		47	41	36	34
8	61	48	40	34		60	47	39	34		46	39	33		44	38	33		43	37	33	31
9	57	44	36	31		56	43	36	31		42	35	30		41	35	30		40	34	30	28
10	54	41	33	28		52	40	33	28		39	32	28		38	32	27		37	31	27	25

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	22.7	6.95	7.14
8.0	12.7	9.26	9.53
10.0	8.2	11.58	11.91
12.0	5.7	13.89	14.29
14.0	4.2	16.21	16.67
16.0	3.2	18.52	19.05

Average Luminance (cd/m^2)

	0 deg Plane	45 deg Plane	90 deg Plane
0	5401	5401	5401
45	3609	3775	4593
55	3185	3365	4290
65	2724	2917	3911
75	2202	2370	3372
85	1602	1691	1965

Spacing Criterion

0 degree plane:	1.4
90 degree plane:	1.2
180 degree plane:	1.0
270 degree plane:	1.2

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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	18.3	19.9	18.7	20.2	20.6	14.6	16.1	15.0	16.5	16.9
	3H	20.6	22.0	21.1	22.4	22.8	15.9	17.3	16.4	17.7	18.1
	4H	21.7	23.0	22.1	23.4	23.8	16.4	17.7	16.8	18.1	18.5
	6H	22.7	23.9	23.1	24.3	24.8	16.6	17.8	17.1	18.2	18.7
	8H	23.1	24.3	23.6	24.7	25.2	16.7	17.8	17.1	18.3	18.7
	12H	23.6	24.7	24.1	25.1	25.6	16.7	17.8	17.2	18.2	18.7
4H	2H	18.7	20.0	19.2	20.4	20.9	15.2	16.5	15.7	16.9	17.4
	3H	21.2	22.3	21.7	22.8	23.2	16.8	17.9	17.3	18.4	18.8
	4H	22.4	23.4	22.9	23.9	24.4	17.4	18.4	17.8	18.8	19.3
	6H	23.6	24.4	24.1	24.9	25.4	17.7	18.6	18.3	19.1	19.6
	8H	24.1	24.9	24.6	25.4	26.0	17.8	18.6	18.3	19.1	19.7
	12H	24.7	25.4	25.2	25.9	26.5	17.9	18.6	18.4	19.1	19.7
8H	4H	22.6	23.4	23.1	23.9	24.4	17.9	18.7	18.4	19.2	19.7
	6H	23.9	24.5	24.4	25.1	25.6	18.4	19.1	18.9	19.6	20.1
	8H	24.5	25.1	25.1	25.7	26.2	18.5	19.2	19.1	19.7	20.3
	12H	25.2	25.8	25.8	26.3	26.9	18.6	19.2	19.2	19.7	20.4
12H	4H	22.6	23.3	23.1	23.8	24.4	18.0	18.7	18.5	19.2	19.8
	6H	23.9	24.5	24.4	25.0	25.6	18.6	19.2	19.1	19.7	20.3
	8H	24.6	25.1	25.1	25.7	26.3	18.8	19.3	19.3	19.9	20.5

Maximum UGR = 26.9

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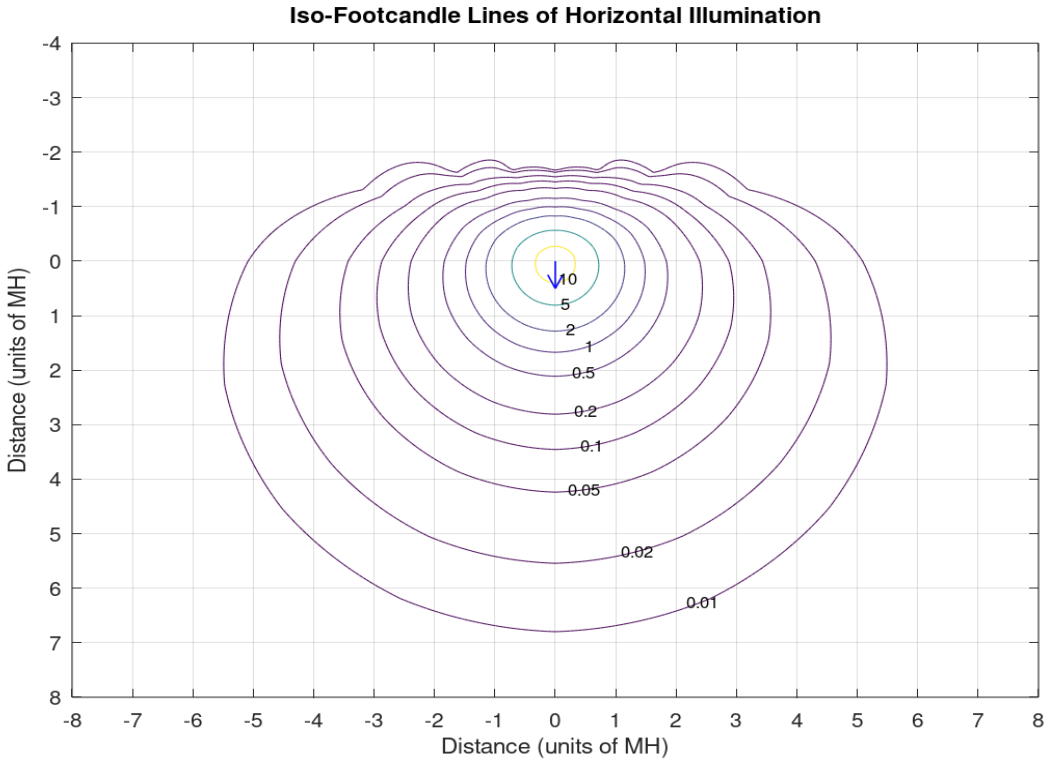
Iso-Illuminance Plot



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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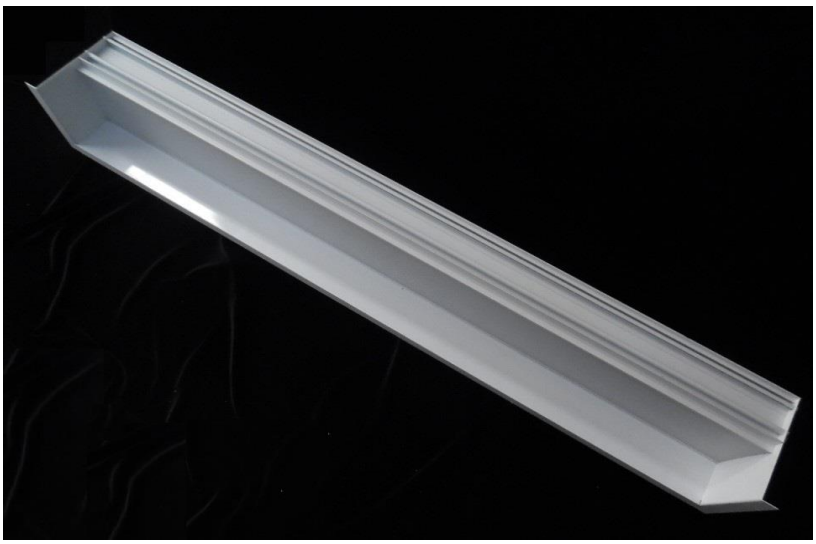
Additional Pictures of Test Subject



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Test Distance	9.5 m
Ambient Temperature	24.7 °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.

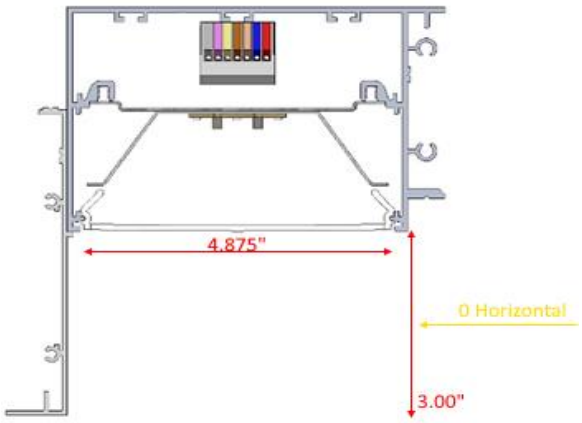
LightLab INTERNATIONAL ALLENTOWN LLC

NVLAP TESTING Lab Code: 201079-0

Report of Test

LLIA001329-010B

Integrating Sphere Report
Catalog Number: PS5-A-MO-K35-80-4-XX-WTR-LOH-XXXV
Recessed mounted, extruded aluminum housing, formed
white enamel aluminum LED tray, translucent white plastic enclosure.
144 white LEDs, two Osram PrevaLED Bars with 72 LEDs each.
One Osram Optotronic OTi 20/120-277/700 DIM-1 L G2LED driver labeled as 480mA



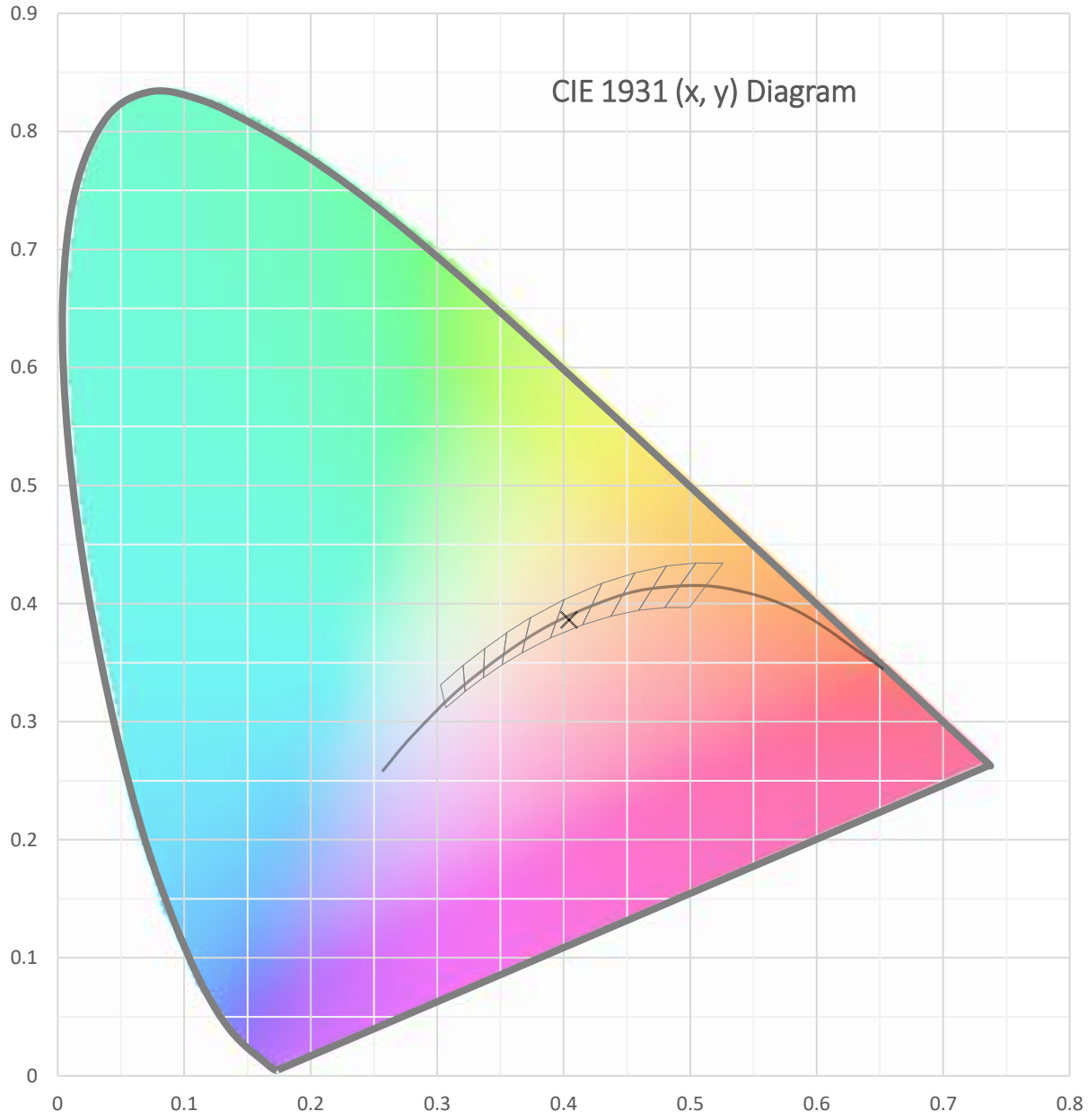
Performance Summary

Voltage	120.0	Vac
Current	0.1541	A
Power	18.29	W
Frequency	59.97	Hz
Power Factor	0.989	
Current THD	6.0	%
Total Luminous Flux	2072.2	lm
Efficacy	113.3	lm/W
Chromaticity (x,y)	(0.4043, 0.3862)	
(u',v')	(0.2369, 0.5092)	
Duv	-0.0018	
CCT	3485	K
CRI (Ra)	84	
R9	16	
TM-30: Rf	83	
TM-30: Rg	96	

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

Test date: 10/12/2020
Report date: 10/14/2020

Test Report Number: LLIA001329-010B



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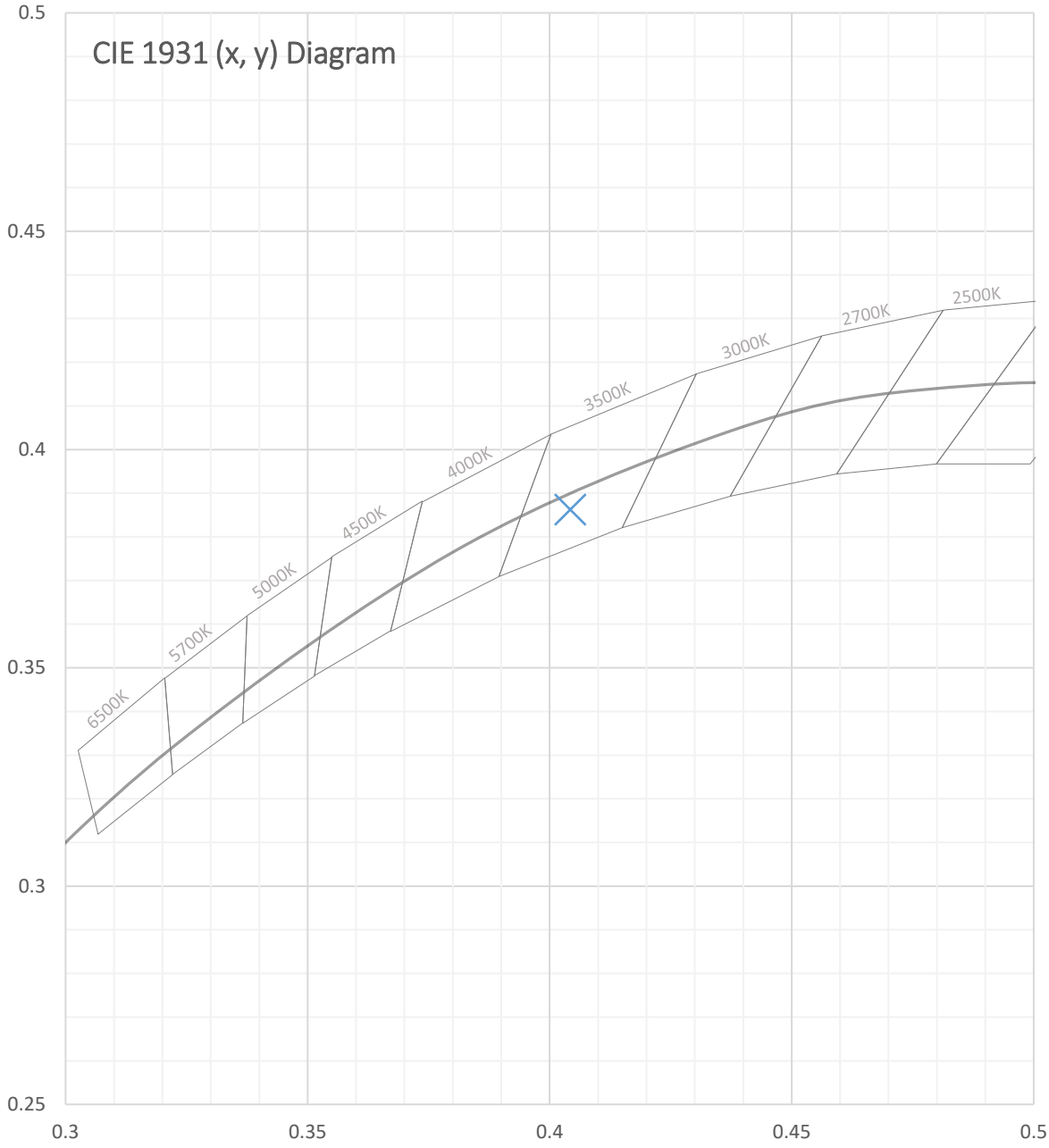

Test Report Number: LLIA001329-010B

Total Radiant Flux	6.452	W
Total Luminous Flux	2072.2	Lm
Chromaticity CIE 1931 (x, y)	(0.4043, 0.3862)	
Chromaticity CIE 1976 (u', v')	(0.2369, 0.5092)	
Correlated Color Temperature (CCT)	3485	K
Color Rendering Index (Ra)	84	
R1	83	
R2	91	
R3	96	
R4	83	
R5	83	
R6	88	
R7	85	
R8	65	
R9	16	
R10	79	
R11	82	
R12	67	
R13	85	
R14	98	
TM-30: Rf	83	
TM-30: Rg	96	
Distance from Planckian Locus (Duv)	-0.0018	
Scotopic/Photopic Ratio ǂ	1.542	

Electrical Data

Voltage	120.0	Vac
Current	0.1541	A
Power	18.29	W
Frequency	59.97	Hz
Power Factor	0.989	
Current THD	6.0	%

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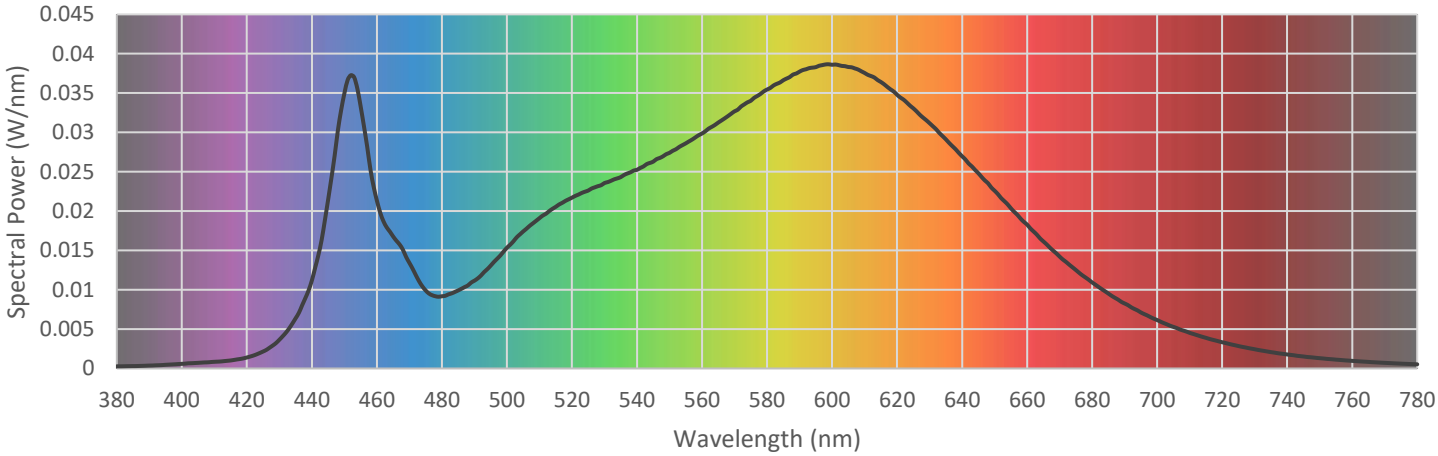
Summary Spectral Power Distribution (wavelength - nm, spectral power - W/nm)

380	0.000277	480	0.009181	580	0.035446	680	0.010933
385	0.000303	485	0.009920	585	0.036630	685	0.009520
390	0.000370	490	0.011156	590	0.037722	690	0.008257
395	0.000467	495	0.013068	595	0.038294	695	0.007116
400	0.000588	500	0.015347	600	0.038596	700	0.006153
405	0.000715	505	0.017417	605	0.038309	705	0.005283
410	0.000846	510	0.019102	610	0.037559	710	0.004527
415	0.001017	515	0.020539	615	0.036411	715	0.003893
420	0.001395	520	0.021705	620	0.034782	720	0.003335
425	0.002159	525	0.022611	625	0.033056	725	0.002848
430	0.003651	530	0.023564	630	0.031169	730	0.002442
435	0.006380	535	0.024318	635	0.029118	735	0.002078
440	0.011191	540	0.025247	640	0.026967	740	0.001780
445	0.021466	545	0.026287	645	0.024813	745	0.001525
450	0.034964	550	0.027403	650	0.022590	750	0.001305
455	0.033292	555	0.028609	655	0.020362	755	0.001122
460	0.021323	560	0.029858	660	0.018282	760	0.000965
465	0.016768	565	0.031251	665	0.016146	765	0.000833
470	0.013413	570	0.032679	670	0.014220	770	0.000713
475	0.009911	575	0.034018	675	0.012510	775	0.000613
						780	0.000529



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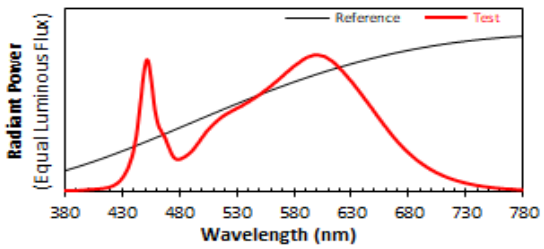
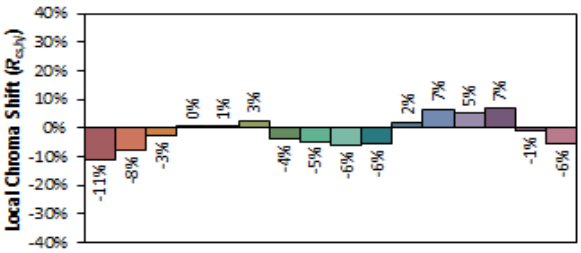
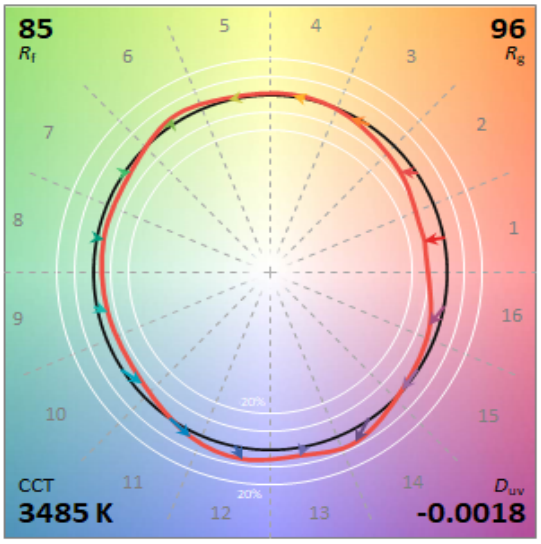
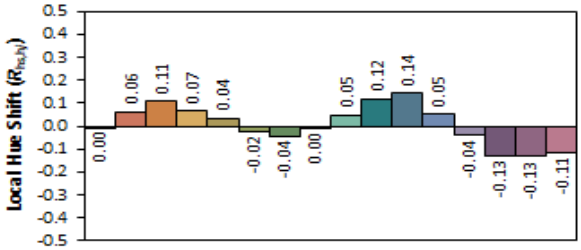
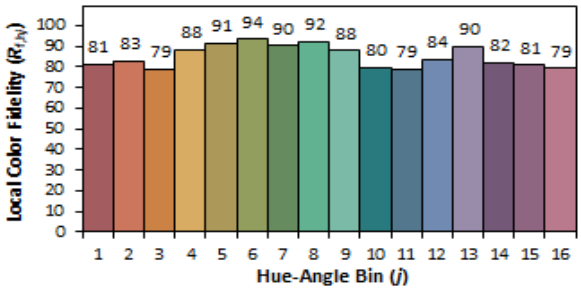
IES TM-30 Details

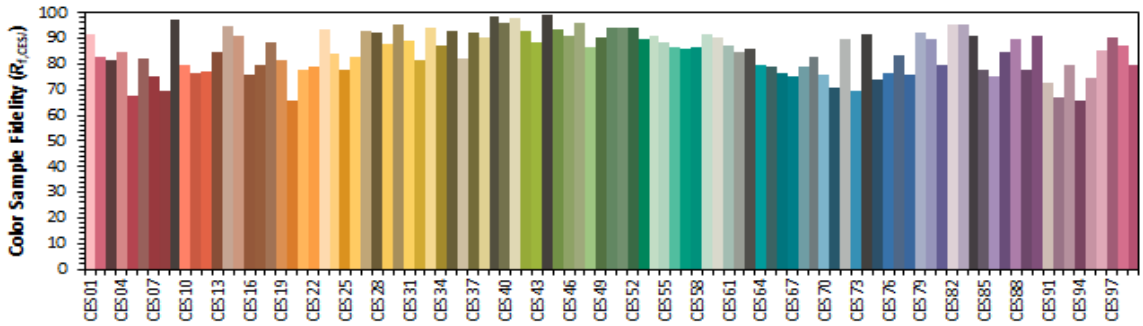












Notes:

x	0.4043
y	0.3861
u'	0.2369
v'	0.5092

CIE 13.3-1995 (CRI)

R_a	84
R_9	16

Test Report Number: LLIA001329-010B

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:	24.9 °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.

USA west coast LightLab International, LLC, 24825 N. 16th Avenue, Suite 125, Phoenix, AZ, 85085, Ph : +1 623-434-1499, Fx : +1 623-434-1492, www.lightlabint.com

USA east coast LightLab Int'l Allentown LLC, 905 Harrison Street, Suite 135, Allentown, PA 18103, Ph: +1 484-273-0705, www.lightlaballentown.com (issuing laboratory)

Australasia & S.E. Asia LightLab International, 50 Redcliffe Gardens Drive, Clontarf, Queensland, 4019, Australia, Ph : +61 7 3283 7862, Fx : +61 7 3283 8751, www.lightlabint.com