LightLab INTERNATIONAL ALLENTOWN LLC

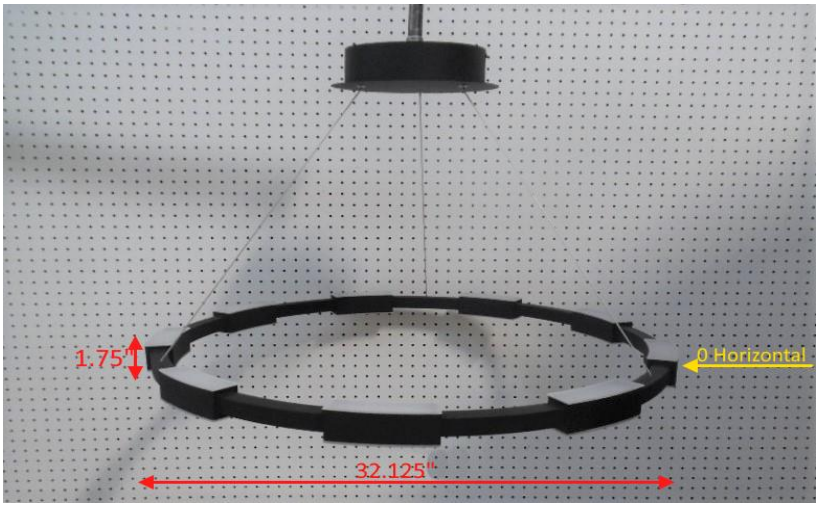
NVLAP TESTING Lab Code: 201079-0

Report of Test

LLIA001431-004A

Indoor Distribution Photometry Test Report

Catalog Number: 3-23-15 Dieter
Pendant mounted, formed steel canopy and housing,
frosted plastic enclosures.
864 white LEDs
One Novbo NE07004018G-2G LED driver



Prepared For:
Oxygen Lighting
201 Railhead Road
Fort Worth, TX 76106, USA

Performance Summary					
Input Voltage	120.0	V	Luminous Flux	4493.1	Lumens
Input Current	0.5979	A	Total Efficacy	63.7	Lm/W
Input Power	70.50	W	Downward Flux	2304.4	Lumens
Frequency	60.00	Hz	Downward Flux	51.3	% of Total
Power Factor	0.983				
Current THD	17.9	%			

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

Test date: 04/01/2021
Report date: 04/07/2021

Signed: Michael L. Grather

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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

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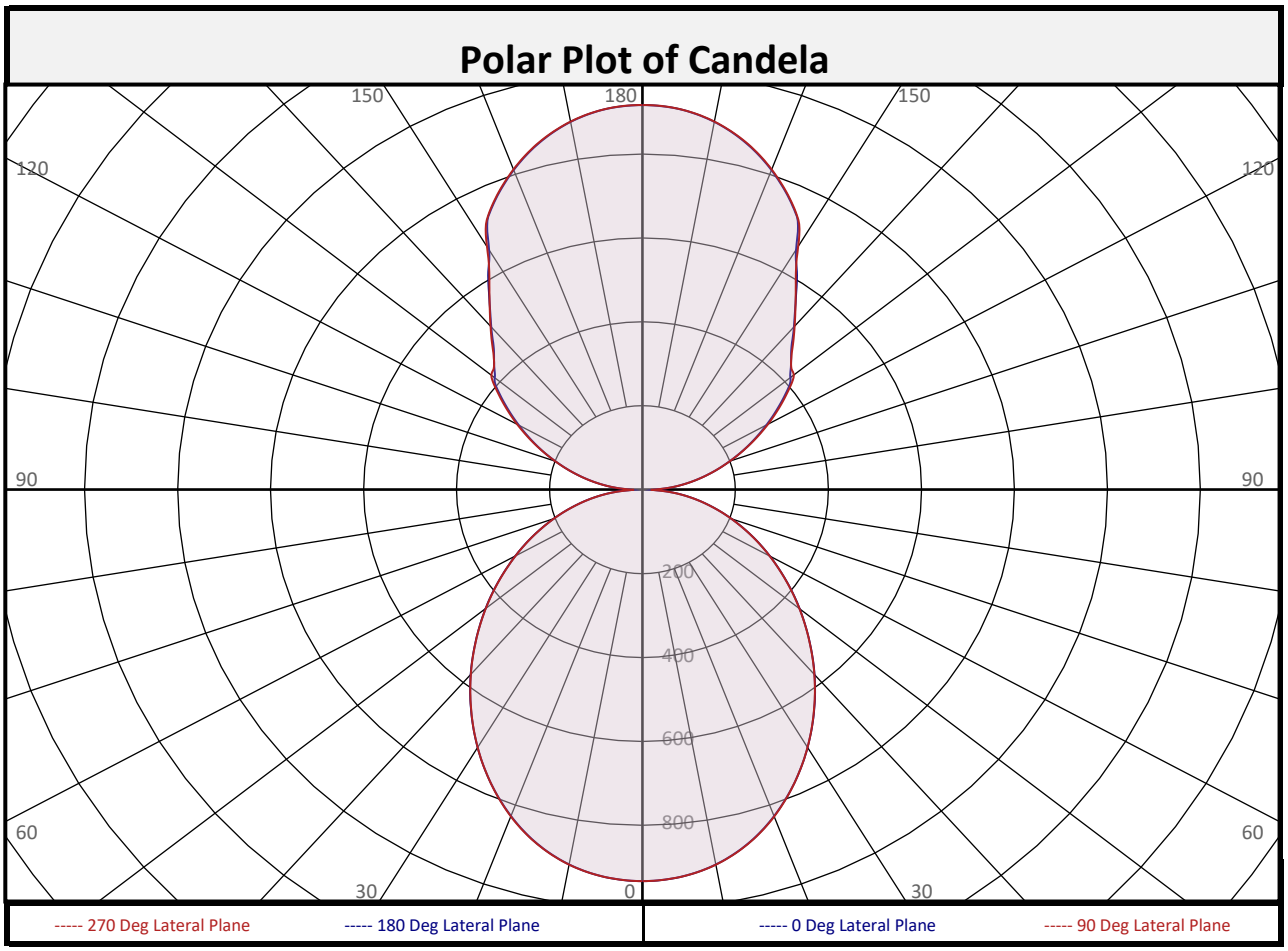

Zonal Flux Summary

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	87.9	2.0%	90-100	63.4	1.4%	0-20	333.7	7.4%
10-20	245.8	5.5%	100-110	159.0	3.5%	0-30	688.7	15.3%
20-30	355.0	7.9%	110-120	250.1	5.6%	0-40	1091	24.3%
30-40	401.9	8.9%	120-130	327.4	7.3%	0-60	1819	40.5%
40-50	391.2	8.7%	130-140	353.5	7.9%	0-80	2239	49.8%
50-60	337.4	7.5%	140-150	361.4	8.0%	10-90	2217	49.3%
60-70	256.9	5.7%	150-160	346.2	7.7%	20-50	1148	25.6%
70-80	163.1	3.6%	160-170	241.3	5.4%	40-90	1214	27.0%
80-90	65.1	1.4%	170-180	86.4	1.9%	60-90	485.1	10.8%
0-90	2304	51.3%	90-180	2189	48.7%	0-180	4493	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	933	933	933	933	933	933	933	933	933
	2.5	931	931	931	931	931	931	931	931	931
	5	926	926	926	926	926	926	926	926	926
	7.5	918	918	918	918	919	918	918	918	918
	10	907	907	907	907	907	907	907	907	907
	12.5	892	892	892	892	892	892	892	892	892
	15	874	874	874	874	874	874	874	874	874
	17.5	852	852	852	852	853	852	852	852	852
	20	827	827	828	828	828	828	828	827	827
	22.5	800	801	801	801	801	801	801	801	800
	25	772	772	772	772	772	772	772	772	772
	27.5	741	741	741	741	741	741	741	741	741
	30	709	709	710	709	709	709	710	709	709
	32.5	677	677	676	676	676	676	676	677	677
	35	643	643	643	643	642	643	643	643	643
	37.5	609	609	609	609	609	609	609	609	609
	40	575	575	575	575	575	575	575	575	575
	42.5	541	541	541	541	540	541	541	541	541
	45	507	507	507	507	506	507	507	507	507
	47.5	473	474	473	473	473	473	473	474	473
	50	441	441	441	441	440	441	441	441	441
	52.5	409	409	408	408	408	408	408	409	409
	55	377	377	377	377	376	377	377	377	377
	57.5	346	346	346	346	346	346	346	346	346
	60	316	316	316	316	316	316	316	316	316
	62.5	287	287	287	287	287	287	287	287	287
	65	259	259	259	259	259	259	259	259	259
	67.5	231	232	232	231	231	231	232	232	231
	70	205	205	205	205	205	205	205	205	205
	72.5	179	179	180	180	179	180	180	179	179
	75	154	154	154	154	154	154	154	154	154
	77.5	130	130	130	130	130	130	130	130	130
	80	106	106	106	106	106	106	106	106	106
	82.5	83	83	83	83	83	83	83	83	83
	85	59	59	59	59	59	59	59	59	59
	87.5	35	34	34	34	34	34	34	34	35
	90	22	22	20	19	18	19	20	22	22

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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	22	22	20	19	18	19	20	22	22
	92.5	34	33	34	33	33	33	34	33	34
	95	58	57	58	58	58	58	58	57	58
	97.5	80	80	81	81	81	81	81	80	80
	100	103	103	104	104	104	104	104	103	103
	102.5	126	126	127	127	127	127	127	126	126
	105	150	149	150	150	151	150	150	149	150
	107.5	174	174	175	175	175	175	175	174	174
	110	199	199	200	200	200	200	200	199	199
	112.5	226	225	226	226	227	226	226	225	226
	115	252	251	252	253	254	253	252	251	252
	117.5	279	278	279	280	282	280	279	278	279
	120	307	306	307	308	311	308	307	306	307
	122.5	335	335	336	337	339	337	336	335	335
	125	364	365	366	366	369	366	366	365	364
	127.5	394	396	397	396	398	396	397	396	394
	130	415	420	425	421	425	421	425	420	415
	132.5	433	436	437	433	434	433	437	436	433
	135	452	456	456	455	453	455	456	456	452
	137.5	476	479	479	479	480	479	479	479	476
	140	506	507	507	507	509	507	507	507	506
	142.5	539	538	540	540	540	540	540	538	539
	145	576	574	577	575	574	575	577	574	576
	147.5	617	616	616	615	614	615	616	616	617
	150	660	671	667	668	669	668	667	671	660
	152.5	723	726	724	723	726	723	724	726	723
	155	756	757	757	757	757	757	757	757	756
	157.5	784	785	785	786	786	786	785	785	784
	160	811	812	812	812	812	812	812	812	811
	162.5	835	836	836	836	837	836	836	836	835
	165	857	857	858	858	858	858	858	857	857
	167.5	875	876	876	876	876	876	876	876	875
	170	891	891	891	891	891	891	891	891	891
	172.5	902	902	903	903	903	903	903	902	902
	175	911	911	911	911	911	911	911	911	911
	177.5	916	915	916	916	916	916	916	915	916
	180	917	917	917	917	917	917	917	917	917

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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	107	107	107	107		99	99	99	99		84	84	84		70	70	70		57	57	57	51
1	98	93	89	86		90	86	83	80		73	71	69		61	60	58		50	49	48	43
2	89	82	75	70		82	76	70	66		64	60	57		54	51	48		44	42	40	36
3	81	72	64	58		75	67	60	55		57	52	48		48	44	41		39	37	34	30
4	74	64	56	49		68	59	52	47		50	45	41		43	38	35		35	32	30	26
5	68	57	48	42		63	53	45	40		45	40	35		38	34	31		32	29	26	23
6	63	51	43	37		58	47	40	35		41	35	31		35	30	27		29	25	23	20
7	58	46	38	32		54	43	36	31		37	31	27		32	27	24		26	23	20	18
8	54	42	34	29		50	39	32	27		34	28	24		29	24	21		24	21	18	16
9	50	38	31	26		47	36	29	24		31	26	22		27	22	19		22	19	17	14
10	47	35	28	23		44	33	26	22		29	23	20		25	20	17		21	18	15	13

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	25.9	6.86	6.86
8.0	14.6	9.15	9.15
10.0	9.3	11.43	11.43
12.0	6.5	13.72	13.72
14.0	4.8	16.01	16.01
16.0	3.6	18.29	18.29

Average Luminance (cd/m^2)

	0 deg Plane	45 deg Plane	90 deg Plane
0	20284	20284	20284
45	15590	15585	15580
55	14289	14289	14272
65	13334	13332	13326
75	12920	12937	12918
85	14690	14748	14746

Spacing Criterion

0 degree plane:	1.1
90 degree plane:	1.1
180 degree plane:	1.1
270 degree plane:	1.1

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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	7.7	8.5	8.6	9.5	10.7	7.6	8.5	8.6	9.5	10.7
	3H	9.4	10.2	10.4	11.2	12.5	9.4	10.2	10.4	11.2	12.5
	4H	10.1	10.9	11.1	11.9	13.1	10.1	10.9	11.1	11.8	13.1
	6H	10.7	11.4	11.7	12.4	13.7	10.7	11.4	11.7	12.4	13.7
	8H	10.9	11.6	11.9	12.6	13.9	10.9	11.6	11.9	12.6	13.9
	12H	11.1	11.7	12.1	12.7	14.0	11.1	11.7	12.1	12.7	14.0
4H	2H	8.2	8.9	9.2	9.9	11.2	8.2	8.9	9.2	9.9	11.2
	3H	10.2	10.8	11.2	11.8	13.1	10.2	10.8	11.2	11.8	13.1
	4H	11.0	11.6	12.0	12.6	13.9	11.0	11.6	12.0	12.6	13.9
	6H	11.7	12.2	12.7	13.3	14.6	11.7	12.2	12.7	13.2	14.6
	8H	12.0	12.5	13.0	13.5	14.8	12.0	12.5	13.0	13.5	14.8
	12H	12.2	12.6	13.2	13.7	15.0	12.2	12.6	13.2	13.7	15.0
8H	4H	11.3	11.8	12.3	12.8	14.1	11.3	11.8	12.3	12.8	14.1
	6H	12.2	12.5	13.2	13.6	14.9	12.2	12.5	13.2	13.6	14.9
	8H	12.6	12.9	13.6	13.9	15.3	12.5	12.9	13.6	13.9	15.3
	12H	12.9	13.1	13.9	14.2	15.6	12.9	13.1	13.9	14.2	15.6
12H	4H	11.3	11.7	12.3	12.8	14.1	11.3	11.7	12.3	12.8	14.1
	6H	12.2	12.6	13.3	13.6	15.0	12.2	12.6	13.3	13.6	15.0
	8H	12.7	13.0	13.7	14.0	15.4	12.7	13.0	13.7	14.0	15.4

Maximum UGR = 15.6

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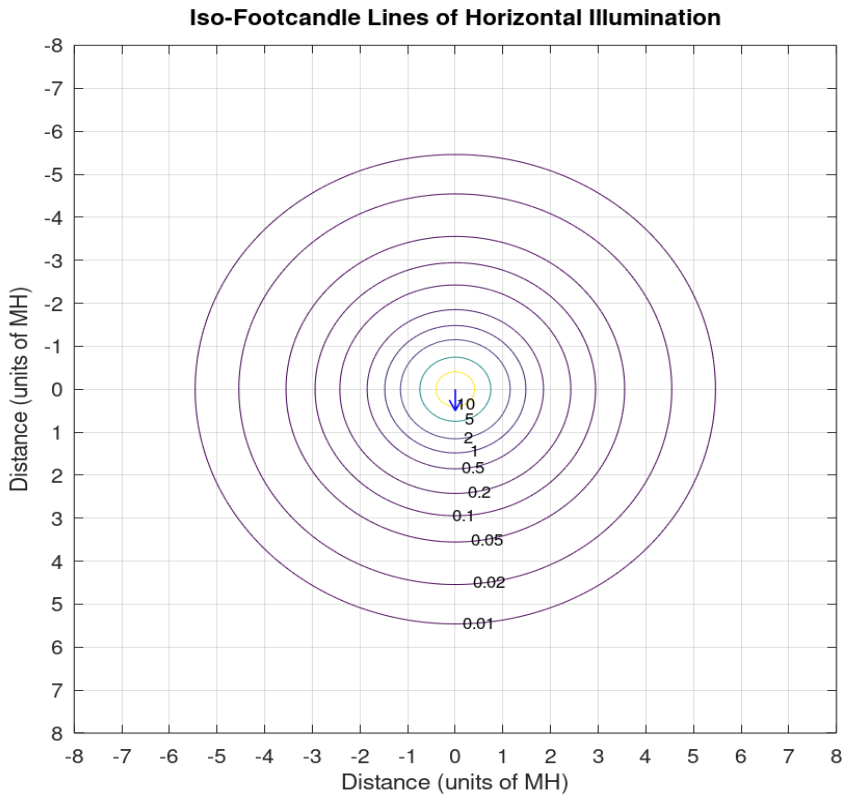
Iso-Illuminance Plot



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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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.

Report of Test

LLIA001431-004B

Integrating Sphere Report
Catalog Number: 3-23-15 Dieter
Pendant mounted, formed steel canopy and housing,
frosted plastic enclosures.
864 white LEDs
One Novbo NE07004018G-2G LED driver

Performance Summary

Voltage	120.0	Vac
Current	0.5979	A
Power	70.51	W
Frequency	59.99	Hz
Power Factor	0.983	
Current THD	17.9	%
Total Luminous Flux	4594.1	lm
Efficacy	65.2	lm/W
Chromaticity (x,y)	(0.4314, 0.4020)	
(u',v')	(0.2479, 0.5197)	
Duv	0.0000	
CCT	3079	K
CRI (Ra)	90	
R9	40	
TM-30: Rf	89	
TM-30: Rg	98	
TM-30: Rcs,h1	-7	

Prepared For:
Oxygen Lighting
201 Railhead Road
Fort Worth, TX 76106, USA

Test date: 04/01/2021
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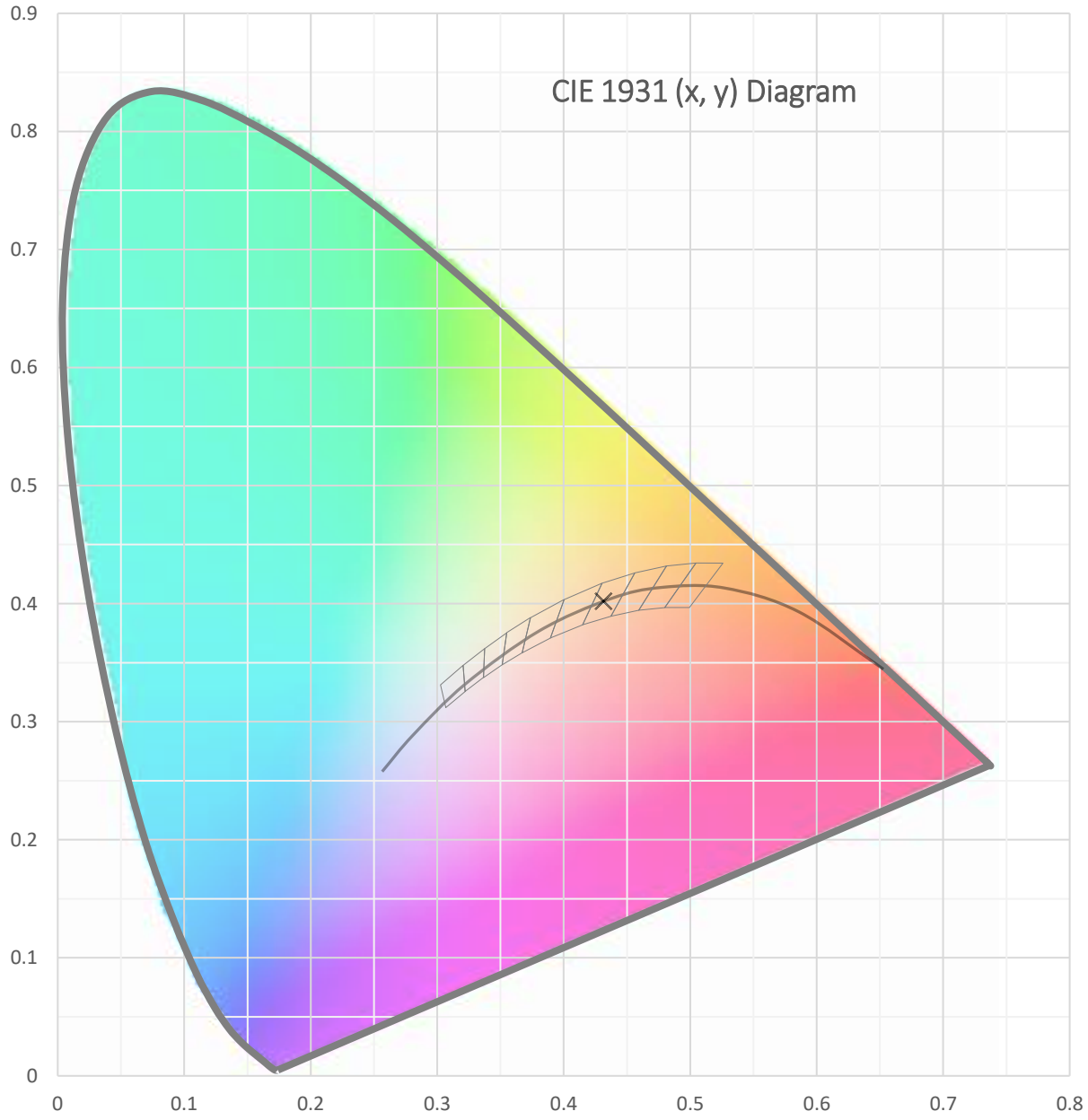
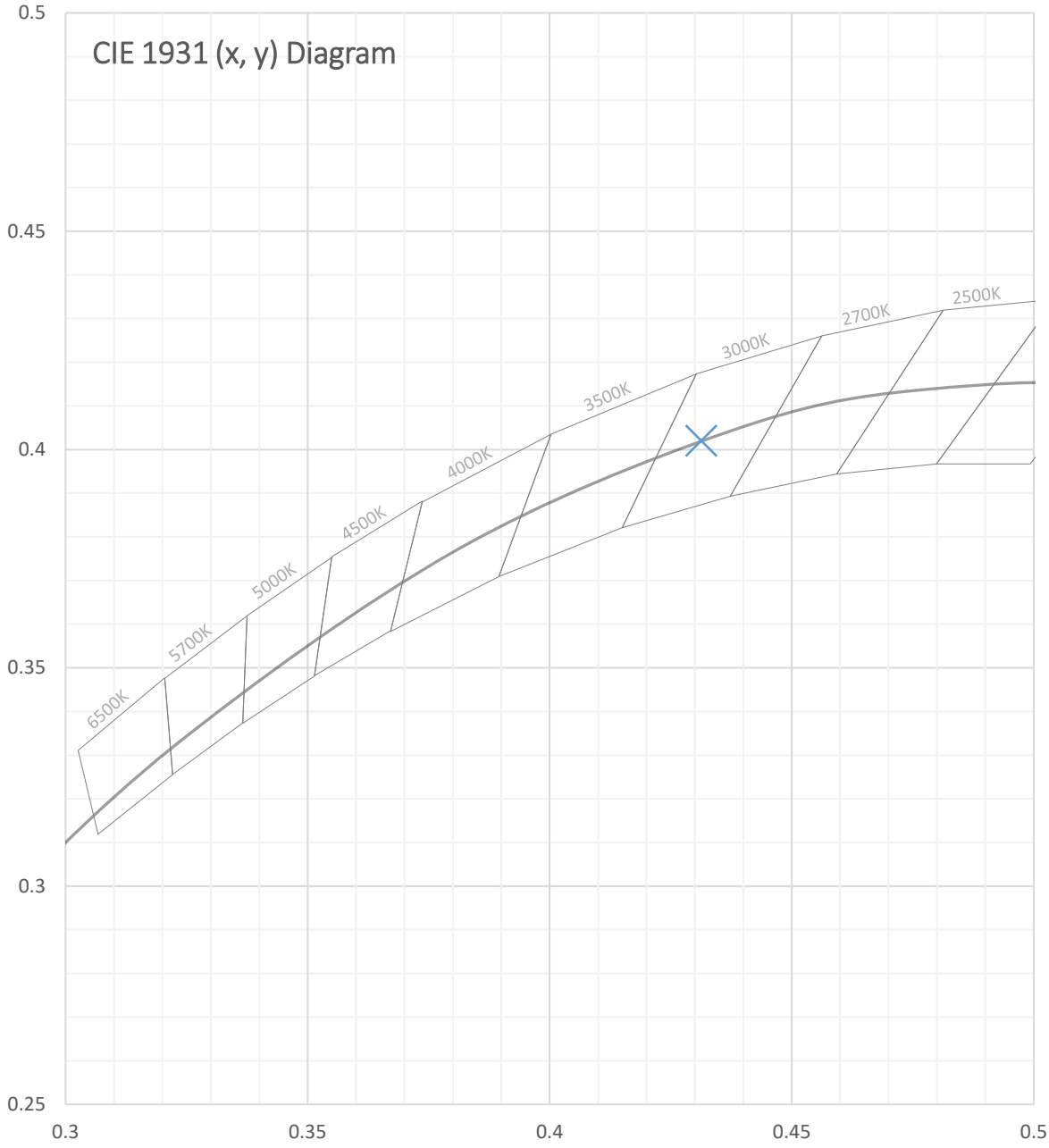


Test Report Number: LLIA001431-004B



Test Report Number: LLIA001431-004B

Total Radiant Flux	14.89	W
Total Luminous Flux	4594.1	Lm
Chromaticity CIE 1931 (x, y)	(0.4314, 0.4020)	
Chromaticity CIE 1976 (u', v')	(0.2479, 0.5197)	
Correlated Color Temperature (CCT)	3079	K
Color Rendering Index (Ra)	90	
R1	90	
R2	96	
R3	98	
R4	90	
R5	90	
R6	95	
R7	88	
R8	73	
R9	40	
R10	89	
R11	92	
R12	79	
R13	92	
R14	100	
TM-30: Rf	89	
TM-30: Rg	98	
TM-30: Rcs,h1	-7	
Distance from Planckian Locus (Duv)	0.0000	
Scotopic/Photopic Ratio ǂ	1.441	

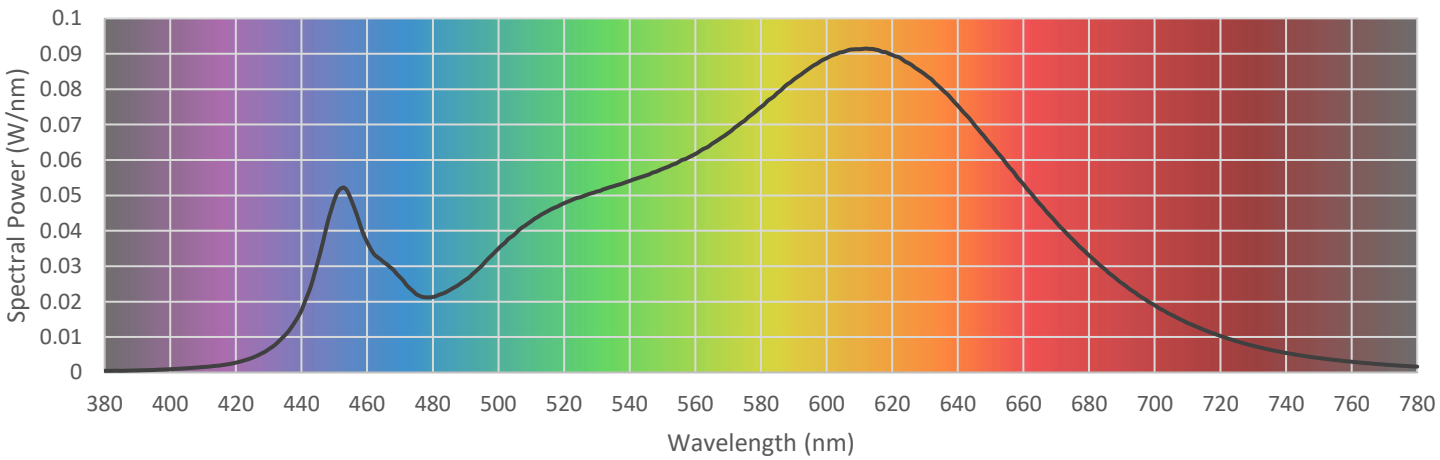
Electrical Data

Voltage	120.0	Vac
Current	0.5979	A
Power	70.51	W
Frequency	59.99	Hz
Power Factor	0.983	
Current THD	17.9	%

Test Report Number: LLIA001431-004B

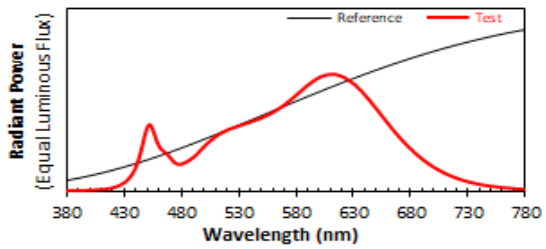
Summary Spectral Power Distribution (wavelength - nm, spectral power - W/nm)

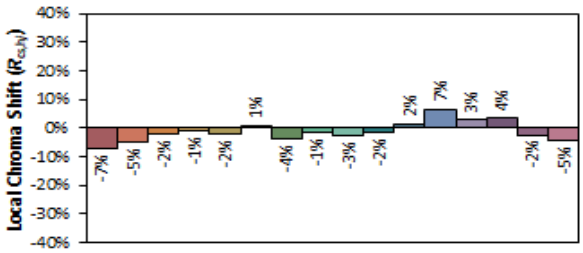
380	0.000472	480	0.021305	580	0.074969	680	0.033051
385	0.000472	485	0.023194	585	0.078944	685	0.029021
390	0.000566	490	0.026183	590	0.082715	690	0.025204
395	0.000706	495	0.030189	595	0.086023	695	0.021829
400	0.000917	500	0.034994	600	0.088734	700	0.018986
405	0.001196	505	0.039054	605	0.090501	705	0.016317
410	0.001534	510	0.042696	610	0.091282	710	0.013991
415	0.001960	515	0.045550	615	0.091162	715	0.012048
420	0.002765	520	0.047798	620	0.089681	720	0.010310
425	0.004166	525	0.049485	625	0.087344	725	0.008799
430	0.006564	530	0.051101	630	0.084171	730	0.007536
435	0.010562	535	0.052568	635	0.080098	735	0.006447
440	0.017576	540	0.054085	640	0.075343	740	0.005508
445	0.031410	545	0.055647	645	0.069977	745	0.004741
450	0.048698	550	0.057489	650	0.064458	750	0.004075
455	0.049027	555	0.059488	655	0.058713	755	0.003509
460	0.036803	560	0.061696	660	0.053182	760	0.003032
465	0.031160	565	0.064526	665	0.047583	765	0.002601
470	0.026917	570	0.067609	670	0.042373	770	0.002223
475	0.022095	575	0.071083	675	0.037556	775	0.001912
						780	0.001642

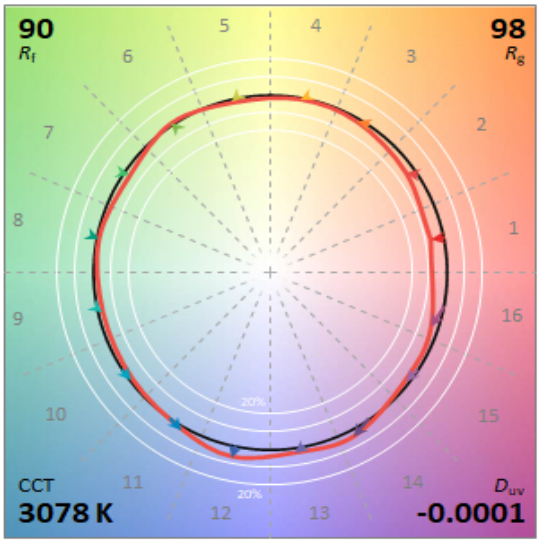


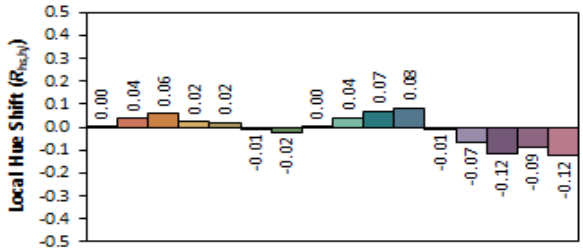
Test Report Number: LLIA001431-004B

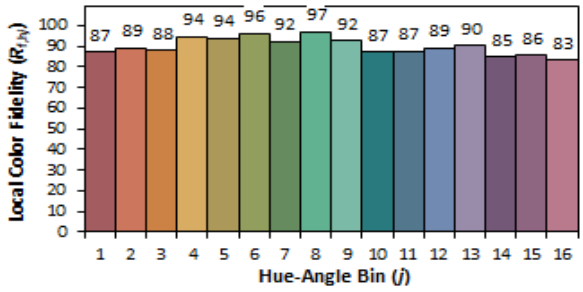
IES TM-30 Details

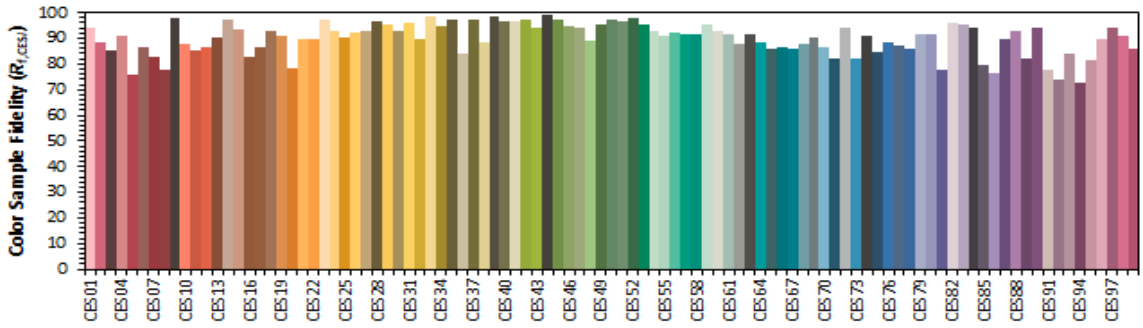












Notes:

x	0.4314
y	0.4020
u'	0.2479
v'	0.5197

CIE 13.3-1995 (CRI)

R_a	90
R_9	40

Test Report Number: LLIA001431-004B

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:	25.1 °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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