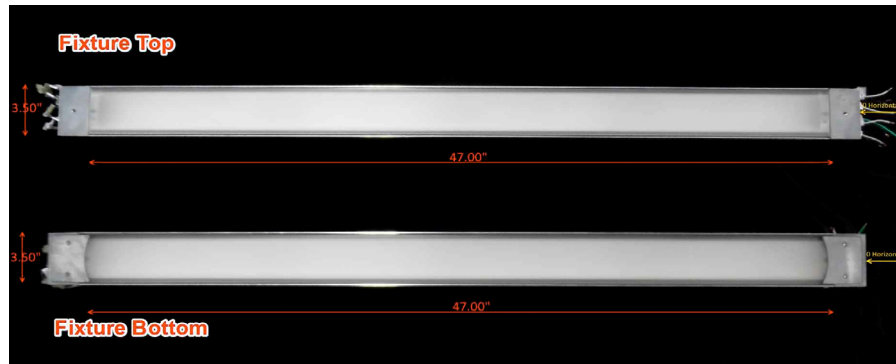


# Report of Test

## LLIA000676-006A-R01\*

\*This test report supersedes test report LLIA000676-006A

Catalog Number: ML3WL-I/D-HO/HO-K40-4-X-LOH/LOH-X-X-UNV  
Direct/indirect pendant luminaire, extruded aluminum housing, upper and lower white reflectors, translucent white plastic enclosures. 264 white LEDs, four lower Osram PrevaLED Bar boards with 36 LEDs each and four upper Osram PrevaLED Line boards with 30 LEDs each.  
Two Osram Optotronic OTi 30/120-277/1A0 DIM L LED drivers.  
120.0Vac, 60.0Hz, 0.4753A, 56.88W, 0.997PF, 6.18%THD(i)



### Performance Summary

Total Light Output	5616 lm
Luminaire Power	56.9 W
Luminous Efficacy	98.7 lm/W

**PREPARED FOR : Precision Architectural Lighting, 4830 Timber Creek Drive, Houston, TX 77017**



**Test Report No. LLIA000676-006A-R01**

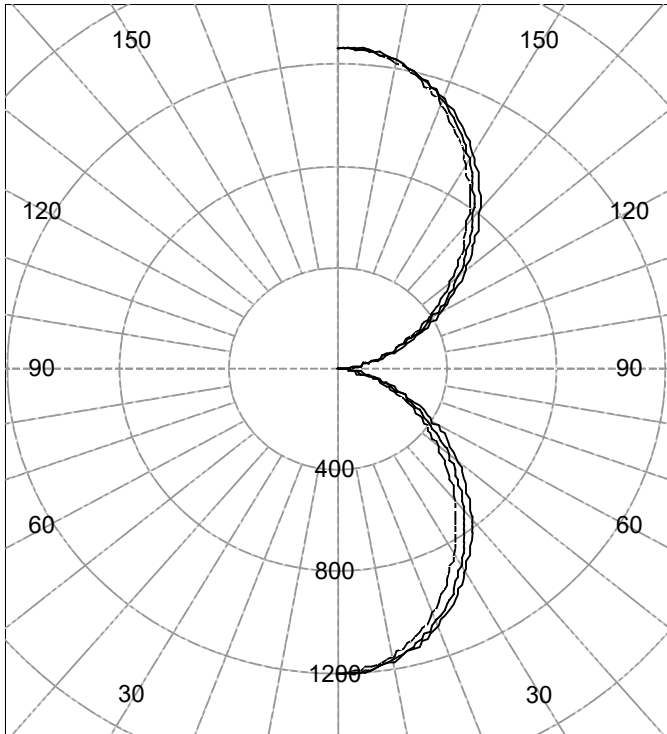
Catalog Number: ML3WL-I/D-HO/HO-K40-4-X-LOH/LOH-X-X-UNV

Direct/indirect pendant luminaire, extruded aluminum housing, upper and lower white reflectors, translucent white plastic enclosures. 264 white LEDs, four lower Osram PrevaLED Bar boards with 36 LEDs each and four upper Osram PrevaLED Line boards with 30 LEDs each.

Two Osram Optotronic OTi 30/120-277/1A0 DIM L LED drivers.

120.0Vac, 60.0Hz, 0.4753A, 56.88W, 0.997PF, 6.18%THD(i)

Legend: C0-Solid, C45-Dashed, C90-Grey (cd)



(Two plane symmetry) C0-C90

**INTENSITY SUMMARY (cd)**

Gamma	C-Plane					Flux (lm)
	C0	C22.5	C45	C67.5	C90	
0.0	1200	1200	1200	1200	1200	
5.0	1191	1185	1195	1191	1182	113
10.0	1166	1159	1165	1158	1146	
15.0	1125	1116	1117	1105	1090	313
20.0	1071	1059	1054	1036	1018	
25.0	1004	989	978	954	933	447
30.0	927	910	893	864	843	
35.0	844	825	802	771	749	499
40.0	755	735	709	677	655	
45.0	664	644	617	584	563	474
50.0	572	554	526	495	476	
55.0	481	466	440	410	394	392
60.0	393	381	357	330	316	
65.0	308	300	278	254	242	274
70.0	228	222	204	183	173	
75.0	154	150	134	118	111	142
80.0	87	85	72	60	56	
85.0	33	30	20	13	11	29
90.0	0	1	2	2	2	

**AVERAGE LUMINANCE (cd / m<sup>2</sup>)**

Gamma	C0	C45	C90
45.0	8836	8207	7497
55.0	7887	7212	6457
65.0	6868	6197	5390
75.0	5584	4887	4033
85.0	3599	2175	1237

**ZONAL FLUX AND PERCENTAGES**

Zone	Flux (lm)	% Lamp	% Luminaire
0-30	872	N / A	15.5
0-40	1371	N / A	24.4
0-60	2238	N / A	39.8
0-90	2683	N / A	47.8
40-90	1312	N / A	23.4
60-90	445	N / A	7.9
90-180	2933	N / A	52.2
0-180	5616	N / A	100.0

Total Light Output = 5,616 lm

Signed:

Michael L. Grather  
Authorized Signatory

Date of test  
Date of report

8-Dec-2016  
15-Jun-2020



**Test Report No. LLIA000676-006A-R01**

Catalog Number: ML3WL-I/D-HO/HO-K40-4-X-LOH/LOH-X-X-UNV

Direct/indirect pendant luminaire, extruded aluminum housing, upper and lower white reflectors, translucent white plastic enclosures. 264 white LEDs, four lower Osram PrevaLED Bar boards with 36 LEDs each and four upper Osram PrevaLED Line boards with 30 LEDs each.

Two Osram Optotronic OTi 30/120-277/1A0 DIM L LED drivers.

120.0Vac, 60.0Hz, 0.4753A, 56.88W, 0.997PF, 6.18%THD(i)

**Intensity data (cd)**

Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
0.0	1200	1200	1200	1200	1200
2.5	1198	1192	1202	1199	1192
5.0	1191	1185	1195	1191	1182
7.5	1181	1174	1182	1177	1167
10.0	1166	1159	1165	1158	1146
12.5	1148	1139	1143	1134	1120
15.0	1125	1116	1117	1105	1090
17.5	1100	1089	1087	1072	1056
20.0	1071	1059	1054	1036	1018
22.5	1039	1025	1017	996	977
25.0	1004	989	978	954	933
27.5	967	951	936	910	889
30.0	927	910	893	864	843
32.5	886	868	848	818	796
35.0	844	825	802	771	749
37.5	800	780	756	724	702
40.0	755	735	709	677	655
42.5	710	690	663	630	609
45.0	664	644	617	584	563
47.5	618	599	571	539	519
50.0	572	554	526	495	476
52.5	526	510	483	452	434
55.0	481	466	440	410	394
57.5	436	423	398	370	354
60.0	393	381	357	330	316
62.5	350	340	317	292	279
65.0	308	300	278	254	242
67.5	268	260	241	218	207
70.0	228	222	204	183	173
72.5	190	185	168	150	142
75.0	154	150	134	118	111
77.5	119	117	102	88	82
80.0	87	85	72	60	56
82.5	58	56	45	35	32
85.0	33	30	20	13	11
87.5	12	8	3	2	2
90.0	0	1	2	2	2



**Test Report No. LLIA000676-006A-R01**

Catalog Number: ML3WL-I/D-HO/HO-K40-4-X-LOH/LOH-X-X-UNV

Direct/indirect pendant luminaire, extruded aluminum housing, upper and lower white reflectors, translucent white plastic enclosures. 264 white LEDs, four lower Osram PrevaLED Bar boards with 36 LEDs each and four upper Osram PrevaLED Line boards with 30 LEDs each.

Two Osram Optotronic OTi 30/120-277/1A0 DIM L LED drivers.

120.0Vac, 60.0Hz, 0.4753A, 56.88W, 0.997PF, 6.18%THD(i)

**Intensity data (cd)**

Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
90.0	0	1	2	2	2
92.5	16	16	17	17	17
95.0	40	40	40	40	39
97.5	67	67	66	65	63
100.0	98	97	95	92	90
102.5	132	130	125	120	118
105.0	168	166	158	151	148
107.5	207	203	193	184	180
110.0	247	242	230	218	213
112.5	289	283	268	254	248
115.0	333	325	308	291	285
117.5	377	369	350	330	324
120.0	421	414	392	371	364
122.5	467	459	437	413	405
125.0	513	505	482	456	448
127.5	560	551	528	500	493
130.0	607	598	575	546	539
132.5	655	645	622	593	586
135.0	704	693	670	641	634
137.5	753	741	718	689	683
140.0	801	788	766	738	733
142.5	848	836	815	787	783
145.0	894	882	862	837	833
147.5	939	927	909	886	882
150.0	982	971	955	934	931
152.5	1023	1013	1000	981	978
155.0	1062	1052	1042	1025	1023
157.5	1098	1089	1082	1068	1065
160.0	1131	1124	1119	1107	1105
162.5	1161	1155	1153	1143	1141
165.0	1188	1182	1183	1175	1173
167.5	1211	1206	1209	1203	1200
170.0	1230	1225	1231	1226	1223
172.5	1245	1241	1248	1245	1242
175.0	1256	1252	1260	1258	1254
177.5	1262	1259	1268	1266	1261
180.0	1265	1265	1265	1265	1265



**Test Number: LLIA000676-006A-R01**

Catalog Number: ML3WL-I/D-HO/HO-K40-4-X-LOH/LOH-X-X-UNV

Direct/indirect pendant luminaire, extruded aluminum housing, upper and lower white reflectors, translucent white plastic enclosures. 264 white LEDs, four lower Osram PrevaLED Bar boards with 36 LEDs each and four upper Osram PrevaLED Line boards with 30 LEDs each.

Two Osram Optotronic OTi 30/120-277/1A0 DIM L LED drivers.

120.0Vac, 60.0Hz, 0.4753A, 56.88W, 0.997PF, 6.18%THD(i)

**Coefficients Of Utilization - Zonal Cavity Method**

Effective Floor Cavity Reflectance 0.20

RC	80				70				50			30			10			0
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
0	107	107	107	107	98	98	98	98	82	82	82	67	67	67	54	54	54	48
1	98	93	90	86	90	86	83	80	72	70	68	60	58	57	48	47	46	41
2	89	82	76	71	82	76	70	66	64	60	57	53	50	48	43	41	39	35
3	81	72	65	59	75	67	61	56	57	52	48	47	44	41	38	36	34	30
4	75	64	56	50	68	59	53	47	50	45	41	42	38	35	34	32	29	26
5	69	57	49	43	63	53	46	41	45	40	36	38	34	31	31	28	26	23
6	63	51	43	38	58	48	41	36	41	35	31	34	30	27	28	25	23	20
7	59	46	39	33	54	43	36	31	37	32	28	31	27	24	26	23	20	18
8	54	42	35	29	50	39	33	28	34	28	25	29	25	21	24	21	18	16
9	51	39	31	26	47	36	29	25	31	26	22	26	22	19	22	19	17	14
10	47	35	28	24	44	33	27	22	29	24	20	24	20	18	20	17	15	13

For absolute test reports, CUs are expressed as a percentage of total lumen 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.

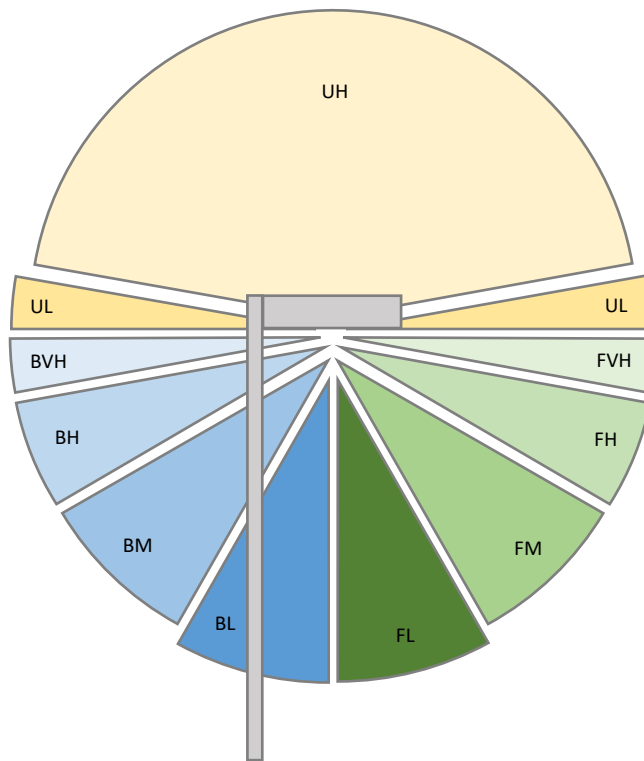
**Circle of Light Plot**

Height(ft)	Illuminance at Nadir (fc)	Beam Width (across 50% Nadir Illum)	
		0-180	90-270
6.0	33.3	6.95	6.43
8.0	18.7	9.27	8.58
10.0	12.0	11.59	10.72
12.0	8.3	13.90	12.86
14.0	6.1	16.22	15.01
16.0	4.7	18.54	17.15

# Report of Test

## LLIA000676-006A-R01

### LCS Tables and Bug Classification



#### Back Light

BL - Back Low (0°-30°)	436.2 Lm
BM - Back Mid (30°-60°)	682.7 Lm
BH - Back High (60°-80°)	208.3 Lm
BVH - Back Very High (80°-90°)	14.4 Lm

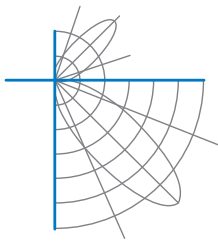
#### Forward Light

FL - Forward Low (0°-30°)	436.2 Lm
FM - Forward Mid (30°-60°)	682.7 Lm
FH - Forward High (60°-80°)	208.3 Lm
FVH - Forward Very High (80°-90°)	14.4 Lm

#### Uplight

UL - Upward Low (90°-100°)	45.7 Lm
UH - Upward High (100°-180°)	2887.4 Lm

BUG Ratings:      B1 - U5 - G1



**Test Report No. LLIA000676-006A-R01**

Catalog Number: ML3WL-I/D-HO/HO-K40-4-X-LOH/LOH-X-X-UNV

Direct/indirect pendant luminaire, extruded aluminum housing, upper and lower white reflectors, translucent white plastic enclosures. 264 white LEDs, four lower Osram PrevaLED Bar boards with 36 LEDs each and four upper Osram PrevaLED Line boards with 30 LEDs each.

Two Osram Optotronic OTi 30/120-277/1A0 DIM L LED drivers.  
120.0Vac, 60.0Hz, 0.4753A, 56.88W, 0.997PF, 6.18%THD(i)





**Test Report No. LLIA000676-006A-R01**

Catalog Number: ML3WL-I/D-HO/HO-K40-4-X-LOH/LOH-X-X-UNV

Direct/indirect pendant luminaire, extruded aluminum housing, upper and lower white reflectors, translucent white plastic enclosures. 264 white LEDs, four lower Osram PrevaLED Bar boards with 36 LEDs each and four upper Osram PrevaLED Line boards with 30 LEDs each.

Two Osram Optotronic OTi 30/120-277/1A0 DIM L LED drivers.  
120.0Vac, 60.0Hz, 0.4753A, 56.88W, 0.997PF, 6.18%THD(i)

**Test Distance** 9.5 m  
**Test Temperature** 24.6 °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 publications: IES LM-79-08 (Sec. 12), IES LM-16-93, IES LM-58-13, CIE 13.3:1995, CIE 15:2004, ANSI C78.377:2011, ANSI C82.77:2002.

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 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.

**Revision** Added LCS Tables and Bug Classification page per customer request.





## Report of Test

**LLIA000676-006B-R01\***

Integrating Sphere Report

Catalog Number: ML3WL-I/D-HO/HO-K40-4-X-LOH/LOH-X-X-UNV

Direct/indirect pendant luminaire, extruded aluminum housing, upper and lower white reflectors, translucent white plastic enclosures. 264 white LEDs, four lower Osram PrevaLED Bar boards with 36 LEDs each and four upper Osram PrevaLED Line boards with 30 LEDs each.

Two Osram Optotronic OTi 30/120-277/1A0 DIM L LED drivers.



### Performance Summary

Voltage	120.0 Vac
Current	0.4747 A
Power	56.77 W
Frequency	60.00 Hz
Power Factor	0.997
Current THD	6.2 %

Total Luminous Flux	5767.9 lm
Efficacy	101.6 lm/W
Chromaticity (x,y)	(0.3802, 0.3781)
(u',v')	(0.2244, 0.5021)
Duv	0.0007
CCT	4016 K
CRI (Ra)	82
R9	12

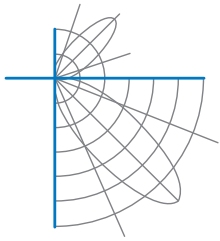
Prepared For:

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

\*This test report supersedes test report LLIA000676-006B

Test date: 12/08/2016

Report date: 06/15/2020

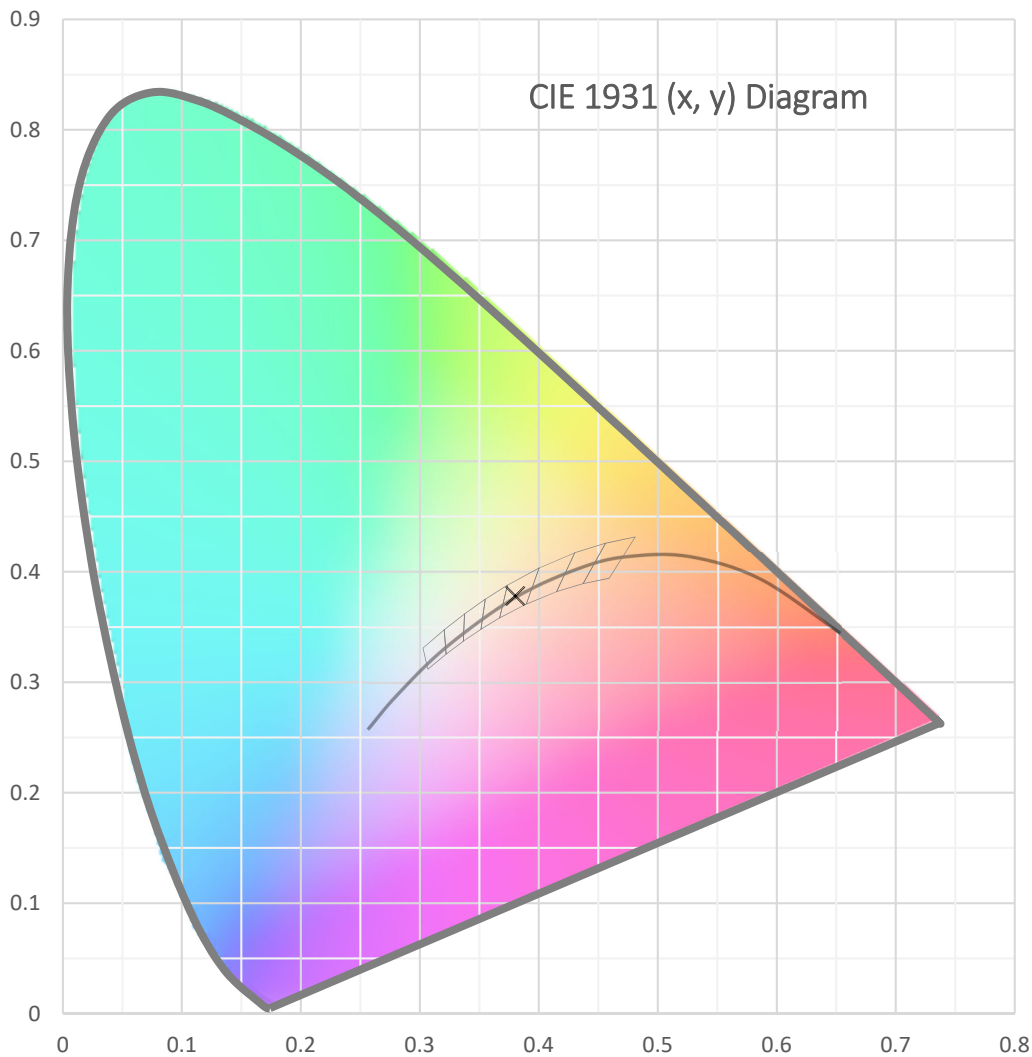


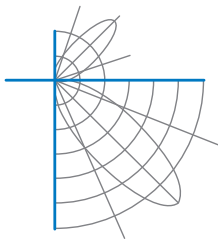
**Test Report Number: LLIA000676-006B-R01**

Catalog Number: ML3WL-I/D-HO/HO-K40-4-X-LOH/LOH-X-X-UNV

Direct/indirect pendant luminaire, extruded aluminum housing, upper and lower white reflectors, translucent white plastic enclosures. 264 white LEDs, four lower Osram PrevaLED Bar boards with 36 LEDs each and four upper Osram PrevaLED Line boards with 30 LEDs each.

Two Osram Optotronic OTi 30/120-277/1A0 DIM L LED drivers.



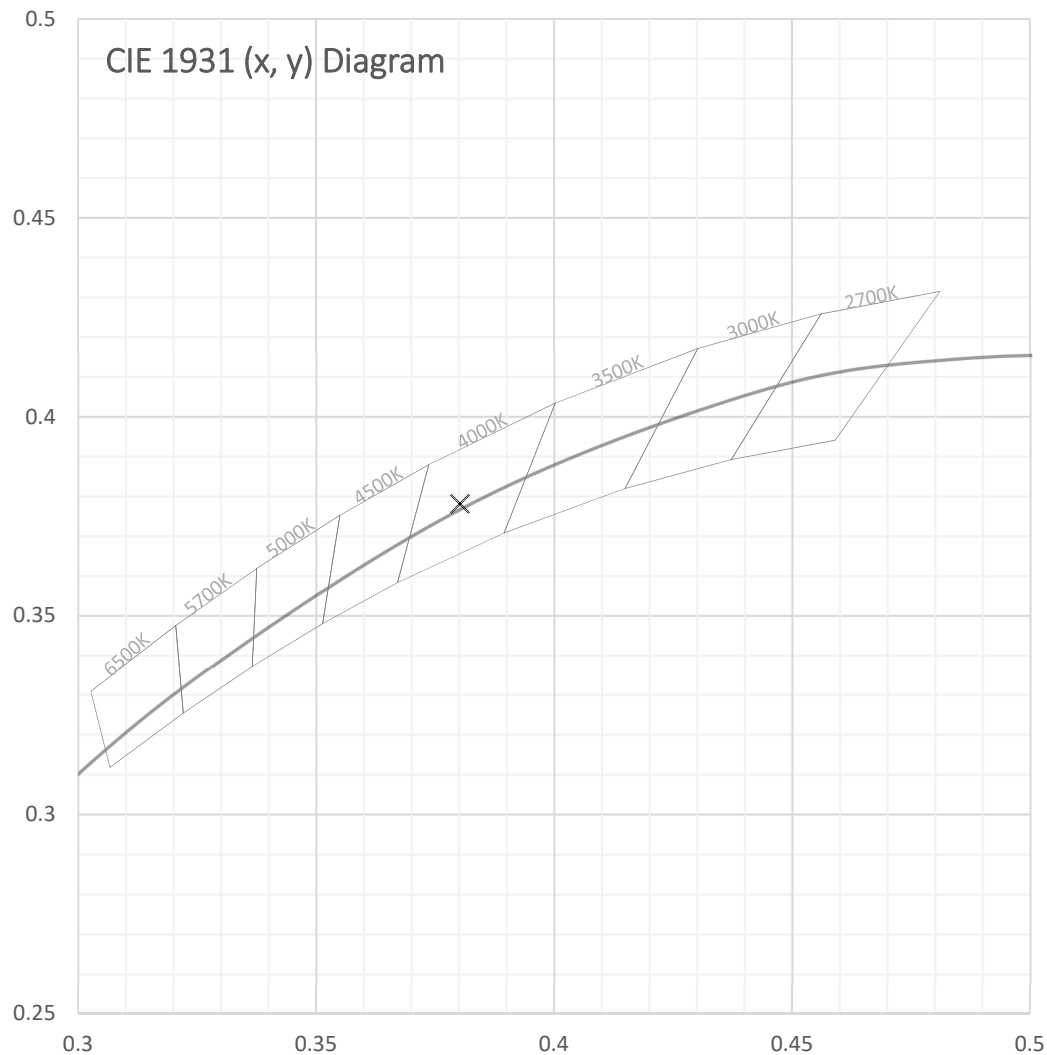


**Test Report Number: LLIA000676-006B-R01**

Catalog Number: ML3WL-I/D-HO/HO-K40-4-X-LOH/LOH-X-X-UNV

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**Test Report Number: LLIA000676-006B-R01**

Catalog Number: ML3WL-I/D-HO/HO-K40-4-X-LOH/LOH-X-X-UNV

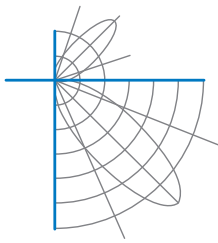
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Two Osram Optotronic OTi 30/120-277/1A0 DIM L LED drivers.

<b>Spectral Data</b>	Total Radiant Flux	17.83 W
	Total Luminous Flux	5767.9 Lm
	Chromaticity CIE 1931 (x, y)	(0.3802, 0.3781)
	Chromaticity CIE 1976 (u', v')	(0.2244, 0.5021)
	Correlated Color Temperature (CCT)	4016 K
	Color Rendering Index (Ra)	82
	R1	81
	R2	87
	R3	92
	R4	81
	R5	80
	R6	82
	R7	87
	R8	67
	R9	12
	R10	69
	R11	79
	R12	58
	R13	82
	R14	96
	Distance from Planckian Locus (Duv)	0.0007
	Scotopic/Photopic Ratio *	1.660

**Electrical Data**

Voltage	120.0 Vac
Current	0.4747 A
Power	56.77 W
Frequency	60.00 Hz
Power Factor	0.997
Current THD	6.2 %



**Test Report Number: LLIA000676-006B-R01**

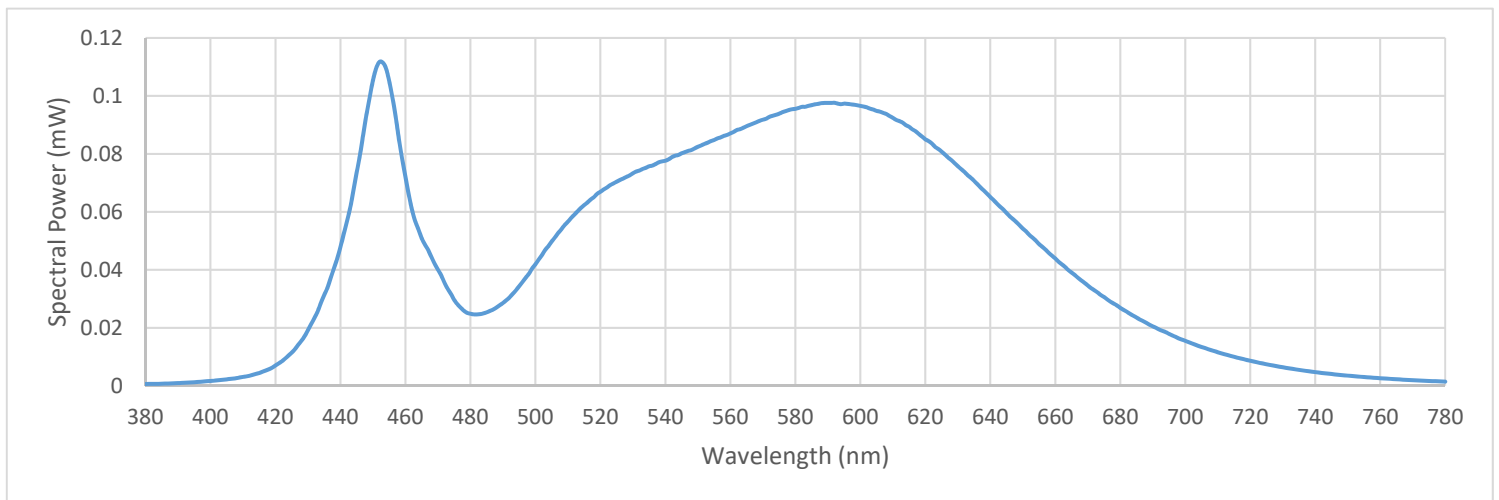
Catalog Number: ML3WL-I/D-HO/HO-K40-4-X-LOH/LOH-X-X-UNV

Direct/indirect pendant luminaire, extruded aluminum housing, upper and lower white reflectors, translucent white plastic enclosures. 264 white LEDs, four lower Osram PrevaLED Bar boards with 36 LEDs each and four upper Osram PrevaLED Line boards with 30 LEDs each.

Two Osram Optotronic OTi 30/120-277/1A0 DIM L LED drivers.

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

380	0.000610	480	0.024861	580	0.095543	680	0.026866
385	0.000704	485	0.025333	585	0.096802	685	0.023548
390	0.000937	490	0.028549	590	0.097608	690	0.020512
395	0.001227	495	0.034323	595	0.097337	695	0.017898
400	0.001660	500	0.041910	600	0.096558	700	0.015514
405	0.002219	505	0.049723	605	0.094833	705	0.013379
410	0.003057	510	0.056606	610	0.092438	710	0.011572
415	0.004402	515	0.062312	615	0.089359	715	0.010004
420	0.006999	520	0.066917	620	0.085040	720	0.008618
425	0.011427	525	0.070415	625	0.080793	725	0.007408
430	0.019183	530	0.073310	630	0.075744	730	0.006385
435	0.031280	535	0.075722	635	0.070700	735	0.005484
440	0.047823	540	0.077639	640	0.065096	740	0.004712
445	0.073539	545	0.080202	645	0.059605	745	0.004062
450	0.105330	550	0.082443	650	0.054233	750	0.003503
455	0.105129	555	0.084777	655	0.048867	755	0.003018
460	0.072102	560	0.087068	660	0.043904	760	0.002617
465	0.050930	565	0.089547	665	0.039071	765	0.002254
470	0.040072	570	0.091788	670	0.034602	770	0.001943
475	0.029634	575	0.093849	675	0.030606	775	0.001677
						780	0.001446





**Test Report Number: LLIA000676-006B-R01**

Catalog Number: ML3WL-I/D-HO/HO-K40-4-X-LOH/LOH-X-X-UNV

Direct/indirect pendant luminaire, extruded aluminum housing, upper and lower white reflectors, translucent white plastic enclosures. 264 white LEDs, four lower Osram PrevaLED Bar boards with 36 LEDs each and four upper Osram PrevaLED Line boards with 30 LEDs each.

Two Osram Optotronic OTi 30/120-277/1A0 DIM L LED drivers.

Test Equipment Configuration:	LightLab International Allentown 2m Integrating Sphere Measurements acquired using a Labsphere CDS 2600 spectroradiometer Testing was performed using 4 $\pi$ geometry
Test Temperature:	24.6 °C
Test Procedure:	Tested in accordance with the applicable sections of: LM-79-08, LM-78-07, LM-58-13, ANSI_ANSLG C78.377-2015, ANSI C82-77-10:2014
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.
Revision:	No change made to this report-revision was issued to keep in numerical order with gonio revision to add LCS page.