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THE LIGHT CENTER OF THE INDUSTRY SINCE 1955

NVLAP
NVLAP LAB CODE: 200925-0

INDEPENDENT TESTING LABORATORIES, INC.
4066 CAMELOT CIRCLE, LONGMONT, CO 80504 USA

PHONE: (303) 442-1255 • FAX: (970) 535-3114 • E-MAIL: itl@itlboulder.com • WEBSITE: www.itlboulder.com

REPORT NUMBER: ITL82334

PAGE: 1 OF 5

ISSUE DATE: 07/29/14

PREPARED FOR: RAB LIGHTING, INC.

CATALOG NUMBER: TRLED2X4-50YN/D10

LUMINAIRE: FABRICATED METAL HOUSING WITH WHITE PAINTED INTERIOR FINISH,
FORMED WHITE PAINTED METAL DRIVER COVER, 4 WHITE CIRCUIT BOARDS EACH
WITH 32 LEDS, CLEAR FLAT PRISMATIC PLASTIC LENS IN FABRICATED WHITE
PAINTED METAL FRAME. LENS PRISMS OUT.

LAMPS: ONE HUNDRED TWENTY-EIGHT WHITE LIGHT EMITTING DIODES (LEDs),
VERTICAL BASE-UP POSITION.

TOTAL INPUT WATTS = 51.4 AT 120.0 VOLTS

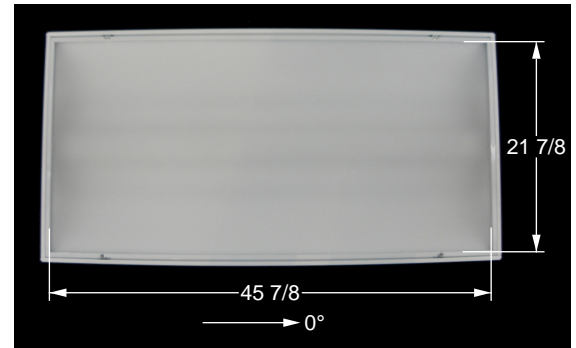
MOUNTING: RECESSED

LED DRIVER: RAB LIGHTING RDD-050W-450G,
DRIVER HAS MULTIPLE LEADS, ONLY LINE
INPUT AND LED OUTPUT LEADS CONNECTED
FOR THIS TEST.

NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE
PROVIDED AT RATED INPUT VOLTAGE
(120VAC, 60Hz) TO THE DRIVER.
DRIVER INFORMATION PROVIDED
BY CLIENT.

TEST PROCEDURE: IESNA LM-79-08

TEST DISTANCE = 35.0 FEET



CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0	FLUX
0	1907	1907	1907	1907	1907	180
5	1892	1900	1897	1895	1896	508
15	1803	1808	1805	1805	1803	743
25	1614	1619	1618	1616	1612	837
35	1339	1344	1341	1339	1338	781
45	1015	1019	1015	1006	1002	613
55	694	693	686	674	673	416
65	428	421	412	408	412	256
75	248	242	238	241	247	97
85	93	88	93	94	100	
90	0	0	0	0	0	

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%FIXT
0- 30	1431	32.3
0- 40	2269	51.2
0- 60	3663	82.6
0- 90	4432	100.0
90-180	0	0.0
0-180	4432	100.0

EFFICACY = 86.2 lm/W

CIE TYPE - DIRECT

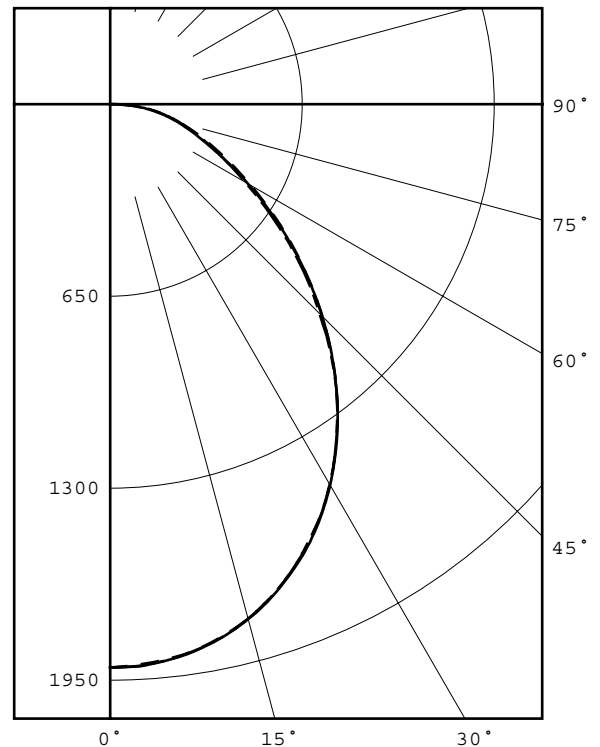
PLANE : 0-DEG 90-DEG

SPACING CRITERIA : 1.17 1.17

LUMINOUS LENGTH : 45.875 21.875

LUMINANCE DATA IN CANDELA/SQ M

ANGLE	AVERAGE	AVERAGE	AVERAGE
IN DEG	0-DEG	45-DEG	90-DEG
45	2217.	2217.	2189.
55	1869.	1847.	1812.
65	1564.	1506.	1506.
75	1480.	1420.	1474.
85	1648.	1648.	1772.



LEGEND:

0-deg - - - - -
45-deg - - - - -
90-deg - - - - -

Checked B. HYRE

Approved R. BEATTIE
Lighting Engineer



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CANDELA DISTRIBUTION
LATERAL ANGLE

	0.0	22.5	45.0	67.5	90.0
0.0	1907	1907	1907	1907	1907
2.5	1901	1907	1906	1903	1905
5.0	1892	1900	1897	1895	1896
7.5	1880	1886	1883	1882	1881
10.0	1860	1866	1863	1861	1862
12.5	1834	1841	1837	1836	1836
15.0	1803	1808	1805	1805	1803
17.5	1764	1770	1767	1767	1764
20.0	1720	1725	1722	1722	1720
22.5	1669	1674	1673	1672	1668
25.0	1614	1619	1618	1616	1612
27.5	1553	1558	1556	1554	1554
30.0	1486	1491	1489	1487	1486
32.5	1415	1420	1417	1416	1415
35.0	1339	1344	1341	1339	1338
37.5	1261	1265	1263	1260	1262
40.0	1181	1186	1181	1177	1178
42.5	1098	1102	1099	1092	1092
45.0	1015	1019	1015	1006	1002
47.5	932	935	931	921	921
50.0	851	852	847	837	837
52.5	771	772	765	754	754
55.0	694	693	686	674	673
57.5	619	617	610	596	598
60.0	550	547	539	527	527
62.5	486	481	473	464	467
65.0	428	421	412	408	412
67.5	377	370	359	361	365
70.0	330	324	314	319	323
72.5	288	281	275	279	284
75.0	248	242	238	241	247
77.5	209	203	202	205	211
80.0	171	166	166	168	174
82.5	132	126	130	131	139
85.0	93	88	93	94	100
87.5	46	45	50	50	53
90.0	0	0	0	0	0



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5-DEGREE
ZONAL LUMEN SUMMARY

0- 5	45
5- 10	134
10- 15	218
15- 20	291
20- 25	350
25- 30	393
30- 35	417
35- 40	421
40- 45	406
45- 50	375
50- 55	332
55- 60	282
60- 65	231
65- 70	186
70- 75	147
75- 80	110
80- 85	71
85- 90	26

10-DEGREE
ZONAL LUMEN SUMMARY

0- 10	180
0- 20	688
0- 30	1431
0- 40	2269
0- 50	3049
0- 60	3663
0- 70	4079
0- 80	4336
0- 90	4432



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COEFFICIENTS OF 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
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	109	105	101	97	107	102	99	95	98	95	92	94	92	90	91	89	87	85
2	100	92	86	80	97	90	84	79	87	82	77	84	79	76	81	77	74	72
3	92	82	74	68	89	80	73	67	77	71	66	74	69	65	72	68	64	62
4	84	73	65	58	82	72	64	58	69	62	57	67	61	56	65	60	56	53
5	78	66	57	51	76	65	57	50	63	55	50	61	54	49	59	53	49	47
6	72	60	51	45	70	59	50	45	57	50	44	55	49	44	54	48	43	41
7	67	54	46	40	66	53	45	40	52	45	39	51	44	39	49	43	39	37
8	63	50	42	36	61	49	41	36	48	41	36	47	40	35	45	40	35	33
9	59	46	38	32	57	45	38	32	44	37	32	43	37	32	42	36	32	30
10	55	42	35	30	54	42	35	30	41	34	29	40	34	29	39	33	29	27

ALL CANDELA, LUMENS, LUMINANCE, AND VCP VALUES IN THIS REPORT ARE BASED ON ABSOLUTE PHOTOMETRY. THE COEFFICIENT OF UTILIZATION VALUES ARE BASED ON THE TOTAL ABSOLUTE LUMEN OUTPUT OF THIS TEST SAMPLE.



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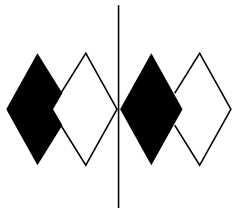
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ADDRESS: 170 LUDLOW AVE
NORTHVALE, NJ 07647

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REPORT NUMBER: ITL82346
DATE: 07/30/14
PREPARED FOR: RAB LIGHTING, INC.
CATALOG NUMBER: TRLED2X4-50YN/D10

ADDRESS: 170 LUDLOW AVE
NORTHVALE, NJ 07647

LUMINAIRE: FABRICATED METAL HOUSING WITH WHITE PAINTED INTERIOR FINISH, FORMED WHITE PAINTED METAL DRIVER COVER, 4 WHITE CIRCUIT BOARDS EACH WITH 32 LEDS, CLEAR FLAT PRISMATIC PLASTIC LENS IN FABRICATED WHITE PAINTED METAL FRAME. LENS PRISMS OUT.

LAMP: ONE HUNDRED TWENTY-EIGHT WHITE LIGHT EMITTING DIODES (LEDs), VERTICAL BASE-UP POSITION.

DRIVER: RAB LIGHTING RDD-050W-450G, DRIVER HAS MULTIPLE LEADS, ONLY LINE INPUT AND LED OUTPUT LEADS CONNECTED FOR THIS TEST.

NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED AT RATED INPUT VOLTAGE (120.0 AND 277.0 VAC, 60Hz) TO THE DRIVER. DRIVER INFORMATION PROVIDED BY CLIENT.

INSTRUMENTS:	Associated Power Technologies APT5040 AC Power Source	Calibration Due: N/A
	Yokogawa WT210 Digital Power Meter #8	12/31/14
	Ocean Optics QE65000 Spectroradiometer	07/14/15
	ITL 2.0m Diameter Integrating Sphere S20-2, 4PI Geometry	07/14/15

OBJECT OF TEST: Measure the Total Radiant Flux*, Spectral Power Distribution (SPD), Correlated Color Temperature (CCT), Color Rendering Indices (CRI_a,1-14), Chromaticity Coordinates (x,y; u'v'), ANSI C78.377 Duv, and electrical data including ANSI C82.77-2002 Power Factor (PF) and Total Harmonic Distortion (THD) to the test sample. Report Off-State Power. Measure electrical data including Total Harmonic Distortion (THD) at maximum rated voltage.

PROCEDURE: The test sample was provided by the customer and had an unknown number of operating hours. The test sample was mounted inside the integrating sphere and allowed to stabilize. After stabilization occurred, measurements were taken. In order to measure mean performance, multiple data sets were recorded and averaged. Readings were taken with the test sample operating at 120.0 VAC input. Electrical data was also recorded at maximum nominal rated input voltage (277.0 VAC). All testing performed in a 25 +/-1 degree Celsius free air ambient and in accordance with IESNA LM-79-08. All data are traceable to the National Institute of Standards and Technology. Off-State Power was reported with no voltage applied to the sample.

*NOTE: Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even when these effects are compensated for, are likely to have a greater variation in results compared to the flux output calculated from a goniophotometric exploration since these artifacts do not affect the goniophotometric results.

RESULTS: (continued subsequent pages)

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Checked	<i>N THOMAS</i>
Approved	<i>P O'CONNOR</i> Sphere Lab Supervisor



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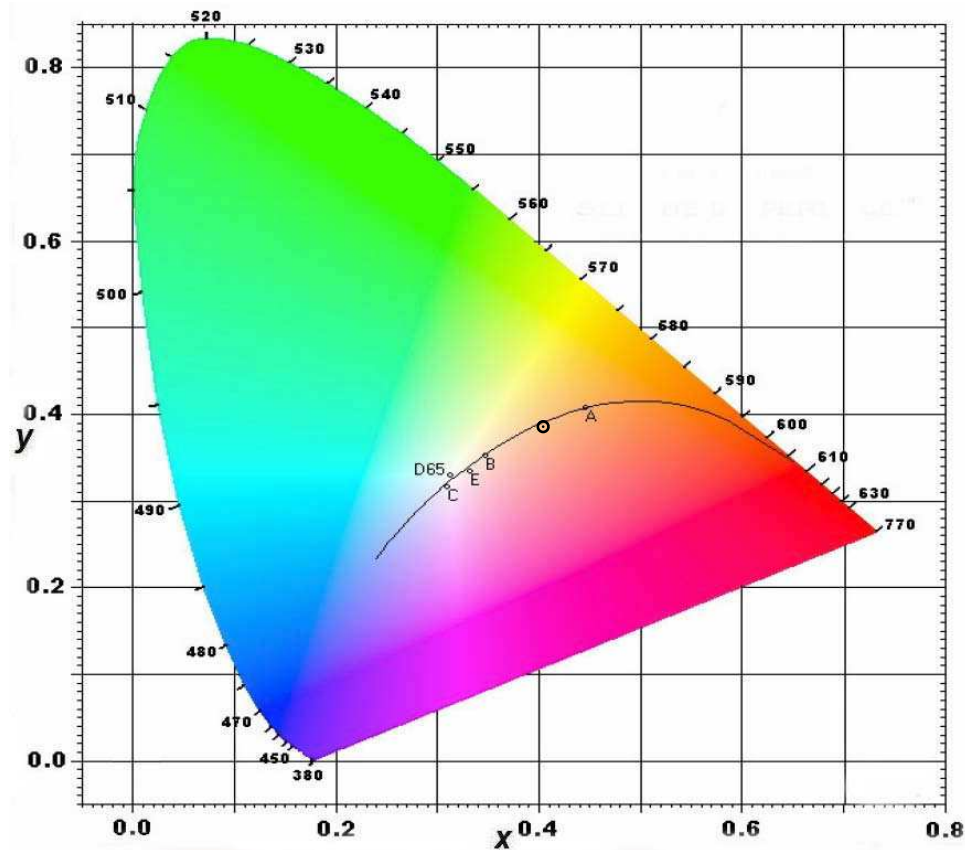
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CIE Chromaticity Diagram



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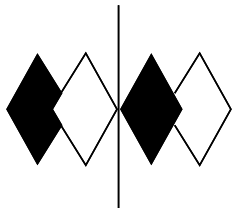
RESULTS:

SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.4040
Chromaticity Ordinate y	0.3853
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2371
Chromaticity Ordinate v'	0.5088
Correlated Color Temp CCT (K)	3484
ANSI C78.377-2008 Duv	-0.002
Total Radiant Flux (milliWatts)	14302 *
ELECTRICAL	
Input Voltage (Volts AC)	120.0
Input Current (Amps AC)	0.432
Input Power (Watts)	51.4
Input Power Factor (%)	99.2
Input Current THD (%)	11.1
Input Voltage THD (%)	0.1
Off-State Power (Watts)	
	0.0
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	277.0
Input Current (Amps AC)	0.199
Input Power (Watts)	50.4
Input Power Factor (%)	91.4
Input Current THD (%)	13.4
Input Voltage THD (%)	0.1

COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	84
R1 Light greyish red	83
R2 Dark greyish yellow	90
R3 Strong yellowish green	94
R4 Moderate yellowish green	82
R5 Light bluish green	82
R6 Light blue	86
R7 Light violet	87
R8 Light reddish purple	70
R9 Strong red	27
R10 Strong yellow	76
R11 Strong green	79
R12 Strong blue	63
R13 Light yellowish pink (skin)	84
R14 Moderate olive green (leaf)	97

*NOTE:

Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even when these effects are compensated for, are likely to have a greater variation in results compared to the flux output calculated from a goniophotometric exploration since these artifacts do not affect the goniophotometric results.



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RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	0.359	515	41.629	650	54.379
385	0.371	520	44.965	655	50.273
390	0.368	525	47.875	660	46.104
395	0.395	530	50.605	665	41.782
400	0.459	535	53.115	670	37.666
405	0.589	540	55.637	675	33.929
410	0.875	545	58.276	680	30.699
415	1.482	550	60.895	685	27.772
420	2.665	555	63.635	690	24.975
425	4.957	560	66.463	695	22.255
430	9.144	565	69.127	700	19.695
435	15.990	570	71.628	705	17.309
440	26.462	575	73.801	710	15.171
445	43.746	580	75.672	715	13.224
450	65.299	585	77.141	720	11.521
455	70.992	590	77.986	725	10.025
460	53.824	595	78.331	730	8.733
465	38.838	600	78.215	735	7.598
470	30.854	605	77.642	740	6.618
475	23.777	610	76.796	745	5.754
480	19.537	615	75.463	750	5.005
485	19.213	620	73.764	755	4.342
490	21.023	625	71.582	760	3.760
495	24.244	630	68.906	765	3.250
500	28.628	635	65.754	770	2.797
505	33.369	640	62.202	775	2.414
510	37.743	645	58.393	780	2.087

