RAB LIGHTING

NVLAP LAB CODE: 201058-0

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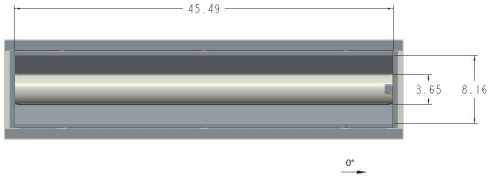
REPORT NUMBER: RAB03317 PAGE: 1 OF 8
ISSUE DATE: 05/11/17 DATE SAMPLE TESTED: 05/11/17
CATALOG NUMBER: RTLED1X4-29NWHC/D10
LUMINAIRE: WHITE PAINTED SHEET METAL HOUSING, 2 WHITE CIRCUIT BOARDS EACH WITH 60 LEDS, MATTE WHITE POLYCARBONATE LENS IN THE CENTER, ROUGH SURFACE FACING OUT. FIXTURE WAS MOUNTED IN FLECO TXF131A232MV UL E43814 HOUSING.
LAMPS: ONE HUNDRED AND TWENTY LIGHT EMITTING DIODES (LEDS), VERTICAL BASE-UP POSITION.
(SEE PAGE 2 FOR MORE INFORMATION)

CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0	FLUX
0	1096	1096	1096	1096	1096	
5	1076	1082	1097	1102	1100	104
15	1031	1039	1059	1067	1071	297
25	943	953	981	997	1004	450
35	819	835	873	898	908	543
45	672	693	738	765	776	564
55	515	542	579	612	625	515
65	356	385	416	464	482	417
75	195	217	276	312	320	279
85	57	82	91	85	81	91
90	3	1	1	1	1	



ZONAL LUMEN SUMMARY

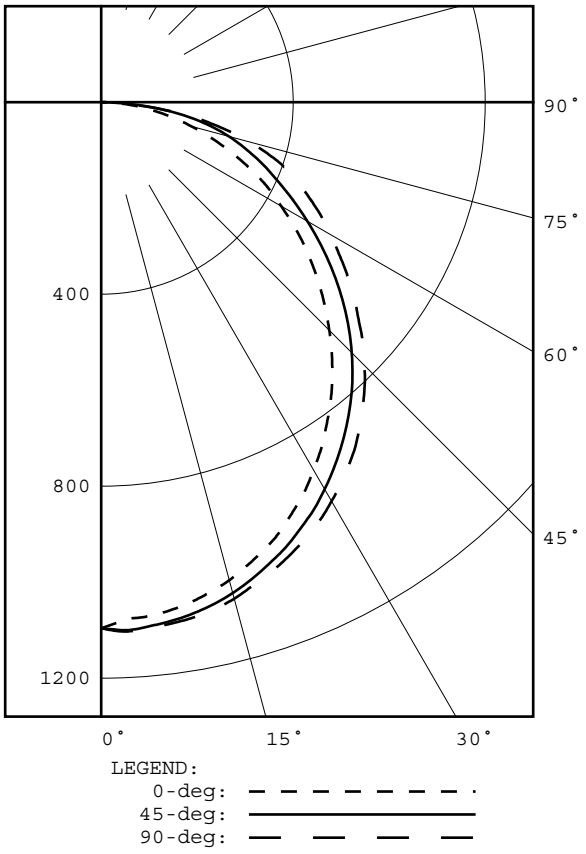
ZONE	LUMENS	%FIXT
0- 30	851	26.1
0- 40	1394	42.8
0- 60	2472	75.8
0- 90	3260	100.0
90-180	0	0.0
0-180	3260	100.0

TOTAL INPUT WATTS = 29.3
EFFICACY = 111.3 Lm/W
CIE TYPE - DIRECT

PLANE	: 0-DEG	90-DEG
SPACING CRITERIA	: 1.2	1.3
PLANE	: 0-DEG	90-DEG
LUMINOUS LENGTH	:45.490	8.160

LUMINANCE DATA IN CANDELA/SQ METER

ANGLE IN DEG	AVERAGE 0-DEG	AVERAGE 45-DEG	AVERAGE 90-DEG
45	3967.	4357.	4581.
55	3748.	4214.	4548.
65	3516.	4109.	4761.
75	3145.	4451.	5161.
85	2730.	4358.	3879.



Checked	*P.ALBERS*
Approved	*D.WANG-MUNSON*

REPORT NUMBER: RAB03317 PAGE: 2 OF 8
ISSUE DATE: 05/11/17 DATE SAMPLE TESTED: 05/11/17
CATALOG NUMBER: RTLED1X4-29NWHC/D10

ADDITIONAL INFORMATION

NOTE: THIS REPORT WITH THE USE OF THE NVLAP LOGO SHALL NOT BE USED BY THE CLIENT TO CLAIM PRODUCT CERTIFICATION, APPROVAL, OR ENDORSEMENT BY NVLAP, NIST, OR ANY AGENCY OF THE FEDERAL GOVERNMENT.
NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED.
TOTAL INPUT WATTS = 29.326 W AT 277.0 VAC.
LED DRIVER: RDF25U7-32
TEST PROCEDURE: IESNA LM-79-08
LM-80 DATA AVAILABLE FROM MANUFACTURER FOR SOLID STATE SOURCE
AMBIENT: 24.7
ACCREDITED LABORATORY CODE 201058-0

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PLANE	:	0-DEG 90-DEG
BEAM ANGLE (50%)	:	105.3 X 120.1 DEGREES
FIELD ANGLE (10%)	:	161.7 X 167.8 DEGREES

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CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0
0.0	1096	1096	1096	1096	1096
2.5	1080	1085	1101	1104	1104
5.0	1076	1082	1097	1102	1100
7.5	1069	1075	1091	1097	1096
10.0	1059	1066	1083	1090	1091
12.5	1046	1053	1072	1079	1082
15.0	1031	1039	1059	1067	1071
17.5	1012	1021	1042	1053	1055
20.0	992	1001	1023	1037	1040
22.5	970	979	1004	1018	1023
25.0	943	953	981	997	1004
27.5	916	927	958	976	984
30.0	885	898	931	952	960
32.5	854	867	903	926	935
35.0	819	835	873	898	908
37.5	785	801	842	868	878
40.0	749	766	809	836	845
42.5	711	731	775	802	812
45.0	672	693	738	765	776
47.5	633	658	700	728	739
50.0	594	621	661	689	699
52.5	554	582	620	651	663
55.0	515	542	579	612	625
57.5	474	503	537	572	587
60.0	433	462	496	536	553
62.5	396	422	456	500	518
65.0	356	385	416	464	482
67.5	314	342	382	429	447
70.0	273	299	346	397	412
72.5	233	257	311	358	369
75.0	195	217	276	312	320
77.5	158	182	236	264	267
80.0	122	149	193	210	212
82.5	88	118	144	150	149
85.0	57	82	91	85	81
87.5	27	41	32	24	21
90.0	3	1	1	1	1

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ISSUE DATE: 05/11/17 DATE SAMPLE TESTED: 05/11/17
CATALOG NUMBER: RTLED1X4-29NWHC/D10

ZONAL LUMEN SUMMARY

0- 5	26.
5- 10	78.
10- 15	126.
15- 20	171.
20- 25	209.
25- 30	241.
30- 35	264.
35- 40	279.
40- 45	284.
45- 50	280.
50- 55	267.
55- 60	248.
60- 65	223.
65- 70	194.
70- 75	160.
75- 80	119.
80- 85	72.
85- 90	20.

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5-DEGREE ZONAL LUMEN SUMMARY

0- 5	26
5- 10	78
10- 15	126
15- 20	171
20- 25	209
25- 30	241
30- 35	264
35- 40	279
40- 45	284
45- 50	280
50- 55	267
55- 60	248
60- 65	223
65- 70	194
70- 75	160
75- 80	119
80- 85	72
85- 90	20
90- 95	0
95-100	0
100-105	0
105-110	0
110-115	0
115-120	0
120-125	0
125-130	0
130-135	0
135-140	0
140-145	0
145-150	0
150-155	0
155-160	0
160-165	0
165-170	0
170-175	0
175-180	0

10-DEGREE ZONAL LUMEN SUMMARY

0- 10	104
0- 20	401
0- 30	851
0- 40	1394
0- 50	1957
0- 60	2472
0- 70	2889
0- 80	3169
0- 90	3260
0-100	3260
0-110	3260
0-120	3260
0-130	3260
0-140	3260
0-150	3260
0-160	3260
0-170	3260
0-180	3260

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CATALOG NUMBER: RTLED1X4-29NWHC/D10

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	108	103	98	94	105	101	96	93	96	93	90	92	90	87	89	86	84	82
2	98	89	82	76	95	87	81	75	84	78	73	80	76	72	77	73	70	68
3	89	78	69	63	86	76	69	62	73	67	61	71	65	60	68	63	59	57
4	81	69	60	53	79	68	59	53	65	58	52	63	56	51	60	55	50	48
5	75	61	52	45	73	60	52	45	58	51	45	56	49	44	54	48	44	41
6	69	55	46	40	67	54	46	39	52	45	39	51	44	39	49	43	38	36
7	64	50	41	35	62	49	41	35	48	40	34	46	39	34	45	39	34	32
8	59	46	37	31	58	45	37	31	44	36	31	42	36	31	41	35	30	28
9	56	42	34	28	54	41	33	28	40	33	28	39	32	28	38	32	27	26
10	52	39	31	25	51	38	30	25	37	30	25	36	30	25	35	29	25	23

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 LUMINAIRE SAMPLE.

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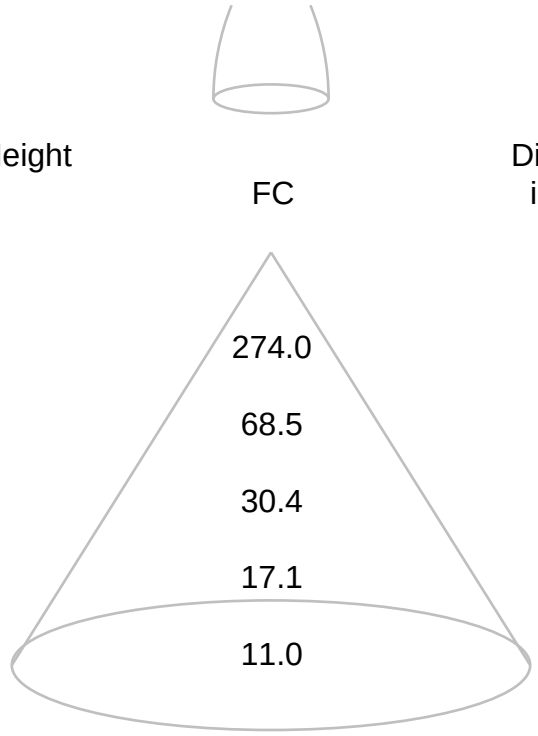
DATE SAMPLE TESTED: 05/11/17

CONE OF LIGHT DIAGRAM

(diameter shown is where fc value is half the fc at nadir)



Mounting Height in feet	FC	Diameter in feet
2.0	274.0	2.5
4.0	68.5	5.0
6.0	30.4	7.5
8.0	17.1	10.0
10.0	11.0	12.6

Note: The candela values used to generate this diagram were obtained by averaging the photometric data into a single plane.

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REPORT NUMBER: RAB03318
DATE: 5/11/2017
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RTLED1X4-29NWHC/D10

ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

LUMINAIRE: WHITE PAINTED SHEET METAL HOUSING, 2 WHITE CIRCUIT BOARDS EACH WITH 60 LEDS, MATTE WHITE POLYCARBONATE LENS IN THE CENTER, ROUGH SURFACE FACING OUT. FIXTURE WAS MOUNTED IN FLECO TXF131A232MV UL E43814 HOUSING.

LAMP: ONE HUNDRED AND TWENTY LIGHT EMITTING DIODES (LEDS), VERTICAL BASE-UP POSITION.

DRIVER: RDF25U7-32

OBJECT OF TEST: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED AT THE RATED INPUT VOLTAGES (277.0 AND 120.0 VAC, 60Hz) TO THE TEST SAMPLE.

INSTRUMENTS:	Calibration Due:
GWINSTEK PROGRAMMABLE AC POWER SOURCE APS-7100	N/A
CHROMA PROGRAMMABLE DIGITAL POWER METER MODEL 66202	3/01/18
OCEAN OPTICS QE65PRO Spectroradiometer	05/03/18
RAB 2.0 meter Diameter Integrating Sphere, 4PI Geometry	05/03/18

OBJECT OF TEST: Measure the Absolute Flux in lumens*, Total Radiant Flux*, Spectral Power Distribution (SPD), Correlated Color Temperature (CCT), Color Rendering Indices (CRIa,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. Measure electrical data including Total Harmonic Distortion (THD) at maximum nominal rated input voltage. Report Off-State Power.

PROCEDURE: The test sample was mounted inside the integrating sphere, energized, 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 60 HZ input in a 25 +/-1 degree Celsius free air ambient and in accordance with IESNA LM-79-08. Electrical data was also recorded at maximum nominal rated input voltage (120.0 VAC). 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)

Checked X.CAO

Approved D.WANG-MUNSON
Lighting Engineer

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DATE: 5/11/2017
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RTLED1X4-29NWHC/D10

RESULTS:

PHOTOMETRIC	
Total Integrated Flux (lumens)	3260 *
SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.3746
Chromaticity Ordinate y	0.3692
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2243
Chromaticity Ordinate v'	0.4973
Correlated Color Temp CCT (K)	4108
ANSI C78.377-2008 Duv	-0.002
Total Radiant Flux (milliWatts)	11630 *
ELECTRICAL	
Input Voltage (Volts AC)	277.0
Input Current (Amps AC)	0.114
Input Power (Watts)	29.3
Input Power Factor (%)	92.9
Input Current THD (%)	11.8
Input Voltage THD (%)	0.2
EFFICACY (Lumens/Watt)	111.3
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	120.0
Input Current (Amps AC)	0.241
Input Power (Watts)	28.8
Input Power Factor (%)	99.6
Input Current THD (%)	8.5
Input Voltage THD (%)	0.2
Off-State Power (Watts)	0.0

COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	94
R1 Light greyish red	96
R2 Dark greyish yellow	94
R3 Strong yellowish green	91
R4 Moderate yellowish green	94
R5 Light bluish green	95
R6 Light blue	91
R7 Light violet	95
R8 Light reddish purple	95
R9 Strong red	86
R10 Strong yellow	85
R11 Strong green	93
R12 Strong blue	73
R13 Light yellowish pink (skin)	95
R14 Moderate olive green (leaf)	94

*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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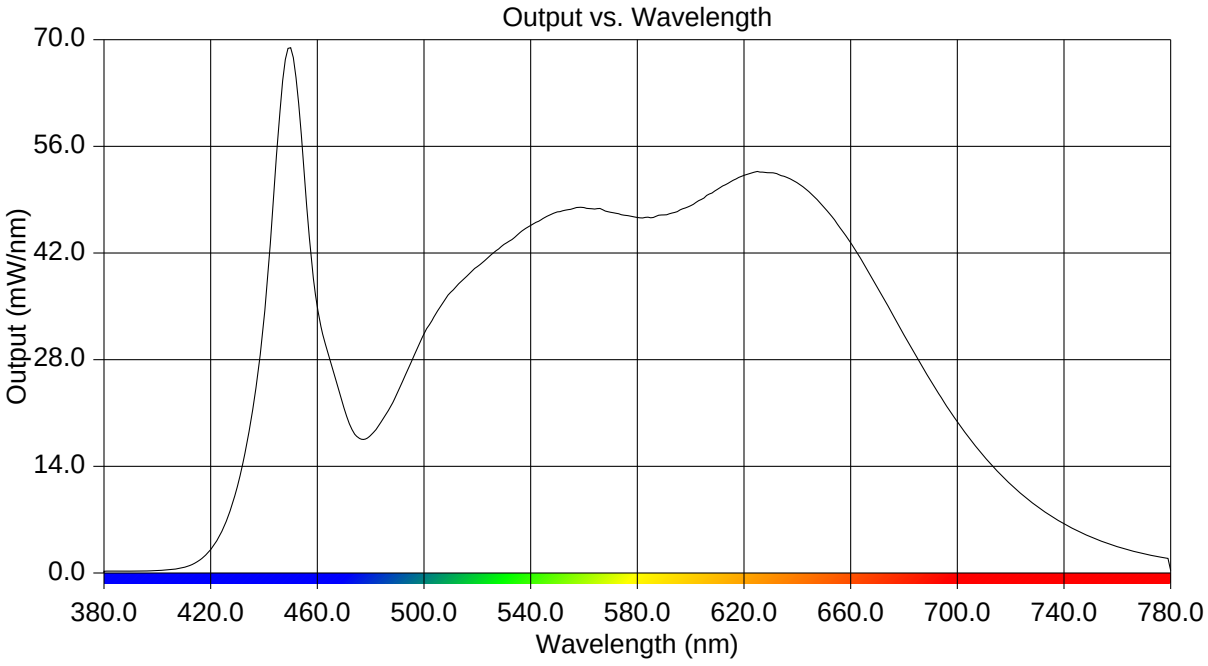
RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	0.224	515	38.610	650	48.013
385	0.249	520	40.211	655	45.799
390	0.248	525	41.665	660	43.375
395	0.260	530	43.130	665	40.493
400	0.322	535	44.371	670	37.492
405	0.446	540	45.606	675	34.408
410	0.750	545	46.600	680	31.243
415	1.489	550	47.395	685	28.227
420	3.069	555	47.720	690	25.238
425	6.101	560	47.962	695	22.441
430	11.325	565	47.826	700	19.907
435	19.749	570	47.342	705	17.491
440	33.374	575	46.962	710	15.314
445	55.915	580	46.683	715	13.361
450	68.946	585	46.620	720	11.638
455	52.854	590	46.998	725	10.095
460	34.858	595	47.431	730	8.703
465	27.673	600	48.207	735	7.494
470	21.654	605	49.215	740	6.416
475	17.865	610	50.346	745	5.535
480	18.070	615	51.355	750	4.753
485	20.432	620	52.210	755	4.062
490	23.641	625	52.703	760	3.473
495	27.515	630	52.519	765	2.966
500	31.389	635	52.070	770	2.530
505	34.342	640	51.188	775	2.162
510	36.844	645	49.837	780	0.323



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CIE Chromaticity Diagram