RAB LIGHTING

NVLAP LAB CODE: 201058-0

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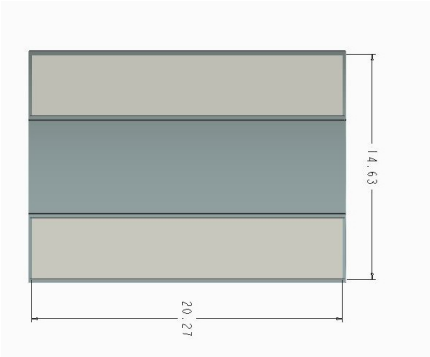
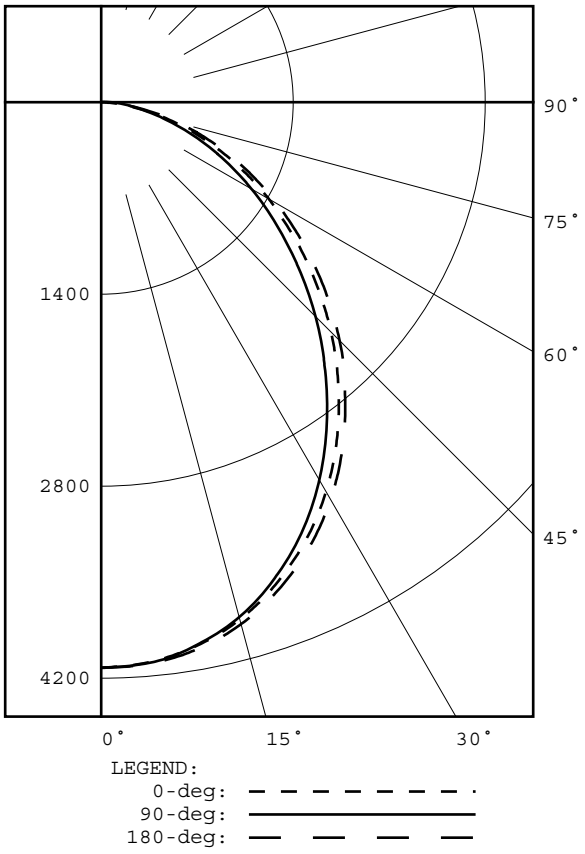
REPORT NUMBER: RAB00846 PAGE: 1 OF 7
ISSUE DATE: 05/04/15 DATE SAMPLE TESTED: 05/04/15
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RAIL95NW
LUMINAIRE: EXTRUDED METAL HOUSING WITH HEAT SINK FINS, FOUR WHITE CIRCUIT BOARD WITH SIXTY FOUR LEDS ON EACH BOARD, METAL REFLECTOR WITH SPECULAR FINISH, FLAT TRANSLUCENT LENS WITH FROSTED SIDE IN.
LAMPS: TWO HUNDRED AND FIFTY SIX LIGHT EMITTING DIODES (LEDS).
NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED.
TOTAL INPUT WATTS = 92.054 W AT 120.0 VAC.
LED DRIVER:RD-085-A1750
TEST PROCEDURE: IESNA LM-79-08



CANDELA DISTRIBUTION						FLUX
	0.0	45.0	90.0	135.0	180.0	
0	4124	4124	4124	4124	4124	
5	4097	4098	4102	4107	4109	389
15	3905	3895	3888	3918	3940	1100
25	3527	3498	3462	3534	3585	1615
35	2997	2937	2867	2985	3069	1848
45	2370	2287	2210	2339	2458	1785
55	1717	1640	1561	1688	1801	1488
65	1104	1040	984	1080	1169	1049
75	537	506	486	539	587	558
85	94	134	164	149	123	164
90	1	43	71	51	10	
95	0	2	12	3	1	12
105	1	1	1	1	1	1
115	1	1	1	2	1	1
125	1	1	1	1	1	1
135	1	2	2	2	2	1
145	2	2	2	2	2	1
155	2	3	3	3	3	1
165	3	3	3	3	3	1
175	3	3	4	4	3	0
180	4	4	4	4	4	



ZONAL LUMEN SUMMARY		
ZONE	LUMENS	%FIXT
0- 30	3105	31.0
0- 40	4953	49.4
0- 60	8225	82.1
0- 90	9996	99.8
90-120	14	0.1
90-130	15	0.2
90-150	18	0.2
90-180	20	0.2
0-180	10017	100.0

TOTAL INPUT WATTS = 92.1
EFFICACY = 108.8 Lm/W
CIE TYPE - DIRECT

PLANE	: 0-DEG	90-DEG	180-DEG
SPACING CRITERIA	: 1.2	1.2	1.2

Checked	X.CAO
Approved	D.WANG-MUNSON

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PLANE	:	0-DEG 90-DEG
BEAM ANGLE (50%)	:	100.7 X 94.5 DEGREES
FIELD ANGLE (10%)	:	155.9 X 153.6 DEGREES

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CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0	112.5	135.0	157.5	180.0
0.0	4124	4124	4124	4124	4124	4124	4124	4124	4124
5.0	4097	4101	4098	4096	4102	4101	4107	4108	4109
10.0	4024	4028	4025	4017	4018	4026	4039	4044	4049
15.0	3905	3907	3895	3887	3888	3898	3918	3934	3940
20.0	3735	3735	3716	3697	3695	3713	3747	3773	3782
25.0	3527	3525	3498	3468	3462	3488	3534	3567	3585
30.0	3279	3273	3234	3194	3181	3216	3278	3334	3345
35.0	2997	2986	2937	2886	2867	2911	2985	3054	3069
40.0	2690	2675	2620	2559	2538	2585	2669	2748	2765
45.0	2370	2350	2287	2223	2210	2251	2339	2423	2458
50.0	2042	2021	1966	1899	1879	1919	2007	2093	2129
55.0	1717	1694	1640	1579	1561	1605	1688	1765	1801
60.0	1412	1383	1335	1283	1267	1298	1380	1442	1479
65.0	1104	1086	1040	996	984	1010	1080	1133	1169
70.0	812	798	761	729	721	741	799	841	871
75.0	537	529	506	485	486	499	539	566	587
80.0	290	291	290	286	293	297	314	323	333
85.0	94	107	134	153	164	160	149	127	123
90.0	1	17	43	61	71	65	51	24	10
95.0	0	0	2	8	12	10	3	1	1
100.0	1	1	1	1	1	1	1	1	1
105.0	1	1	1	1	1	1	1	1	1
110.0	1	1	1	1	1	1	1	1	1
115.0	1	1	1	1	1	1	2	1	1
120.0	1	1	1	1	1	1	1	1	1
125.0	1	1	1	1	1	1	1	1	1
130.0	1	1	1	2	2	2	2	2	1
135.0	1	1	2	2	2	2	2	2	2
140.0	2	2	2	2	2	2	2	2	2
145.0	2	2	2	2	2	2	2	2	2
150.0	2	2	2	2	2	3	3	2	2
155.0	2	2	3	3	3	3	3	3	3
160.0	2	2	3	3	3	3	3	3	3
165.0	3	3	3	3	3	3	3	3	3
170.0	3	3	3	3	4	3	3	3	3
175.0	3	3	3	4	4	4	4	4	3
180.0	4	4	4	4	4	4	4	4	4

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ZONAL LUMEN SUMMARY

0- 5	98.
5- 10	291.
10- 15	471.
15- 20	629.
20- 25	759.
25- 30	856.
30- 35	914.
35- 40	934.
40- 45	917.
45- 50	868.
50- 55	792.
55- 60	696.
60- 65	585.
65- 70	464.
70- 75	339.
75- 80	219.
80- 85	116.
85- 90	47.
90- 95	11.
95-100	1.
100-105	1.
105-110	1.
110-115	1.
115-120	1.
120-125	0.
125-130	1.
130-135	1.
135-140	1.
140-145	1.
145-150	1.
150-155	1.
155-160	1.
160-165	0.
165-170	0.
170-175	0.
175-180	0.

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5-DEGREE ZONAL LUMEN SUMMARY

0- 5	98
5- 10	291
10- 15	471
15- 20	629
20- 25	759
25- 30	856
30- 35	914
35- 40	934
40- 45	917
45- 50	868
50- 55	792
55- 60	696
60- 65	585
65- 70	464
70- 75	339
75- 80	219
80- 85	116
85- 90	47
90- 95	11
95-100	1
100-105	1
105-110	1
110-115	1
115-120	1
120-125	0
125-130	1
130-135	1
135-140	1
140-145	1
145-150	1
150-155	1
155-160	1
160-165	0
165-170	0
170-175	0
175-180	0

10-DEGREE ZONAL LUMEN SUMMARY

0- 10	389
0- 20	1489
0- 30	3105
0- 40	4953
0- 50	6737
0- 60	8225
0- 70	9275
0- 80	9833
0- 90	9996
0-100	10008
0-110	10010
0-120	10011
0-130	10012
0-140	10013
0-150	10014
0-160	10015
0-170	10016
0-180	10017

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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	83	79	75	80	77	74	72
3	91	81	74	67	89	80	73	67	77	71	66	74	69	64	72	67	63	61
4	84	73	64	58	82	71	63	57	69	62	56	66	60	56	64	59	55	53
5	78	65	56	50	75	64	56	50	62	55	49	60	54	49	58	53	48	46
6	72	59	50	44	70	58	50	44	56	49	43	54	48	43	53	47	43	41
7	67	54	45	39	65	53	45	39	51	44	39	50	43	38	48	43	38	36
8	62	49	41	35	61	48	40	35	47	40	35	46	39	34	45	39	34	32
9	58	45	37	32	57	45	37	32	43	36	31	42	36	31	41	35	31	29
10	55	42	34	29	53	41	34	29	40	33	29	39	33	28	38	33	28	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 LUMINAIRE SAMPLE.

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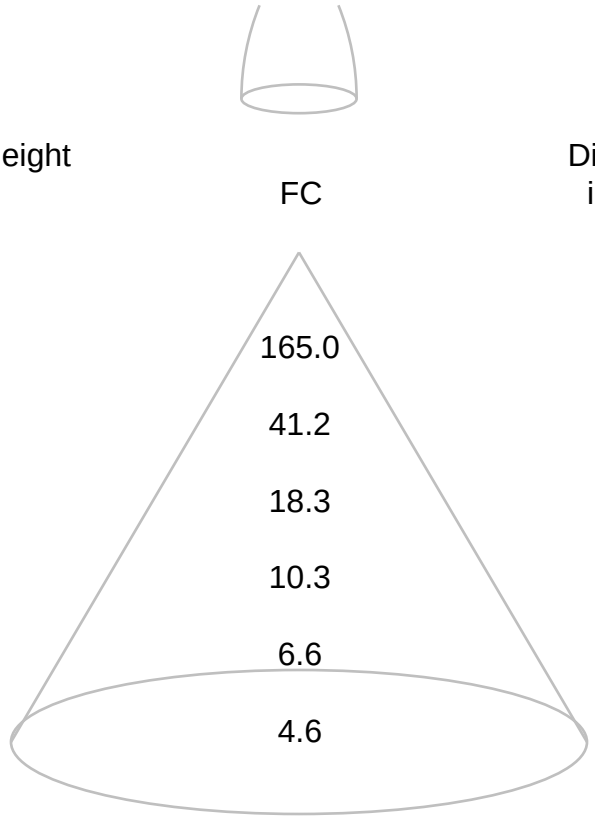
DATE SAMPLE TESTED: 05/04/15

CONE OF LIGHT DIAGRAM

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



Mounting Height in feet	FC	Diameter in feet
5.0	165.0	5.9
10.0	41.2	11.8
15.0	18.3	17.7
20.0	10.3	23.6
25.0	6.6	29.5
30.0	4.6	35.4

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: RAB00849
DATE: 5/15/2015
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RAIL95NW

ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

LUMINAIRE: EXTRUDED METAL HOUSING WITH HEAT SINK FINS, FOUR WHITE CIRCUIT BOARD WITH SIXTY FOUR LEDS ON EACH BOARD, METAL REFLECTOR WITH SPECULAR FINISH, FLAT TRANSLUCENT LENS WITH FROSTED SIDE IN.

LAMP: TWO HUNDRED AND FIFTY SIX LIGHT EMITTING DIODES (LEDS).

DRIVER: RD-085-A1750

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

INSTRUMENTS:	Calibration Due:
CHROMA PROGRAMMABLE AC POWER SOURCE MODEL 61602	N/A
CHROMA PROGRAMMABLE DIGITAL POWER METER MODEL 66202	3/9/16
OCEAN OPTICS QE65PRO Spectroradiometer	5/15/16
RAB 2.0 meter Diameter Integrating Sphere, 4PI Geometry	5/15/16

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 (277.0 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

RAB LIGHTING

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RESULTS:

PHOTOMETRIC	
Total Integrated Flux (lumens)	10017 *
SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.3812
Chromaticity Ordinate y	0.3776
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2253
Chromaticity Ordinate v'	0.5020
Correlated Color Temp CCT (K)	3986
ANSI C78.377-2008 Duv	0.000
Total Radiant Flux (milliWatts)	30857 *
ELECTRICAL	
Input Voltage (Volts AC)	120.0
Input Current (Amps AC)	0.770
Input Power (Watts)	92.1
Input Power Factor (%)	99.7
Input Current THD (%)	5.0
Input Voltage THD (%)	0.2
EFFICACY (Lumens/Watt)	108.8
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	277.0
Input Current (Amps AC)	0.341
Input Power (Watts)	89.9
Input Power Factor (%)	95.2
Input Current THD (%)	11.2
Input Voltage THD (%)	0.2
Off-State Power (Watts)	0.0

COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	84
R1 Light greyish red	82
R2 Dark greyish yellow	90
R3 Strong yellowish green	94
R4 Moderate yellowish green	82
R5 Light bluish green	82
R6 Light blue	85
R7 Light violet	87
R8 Light reddish purple	67
R9 Strong red	16
R10 Strong yellow	74
R11 Strong green	80
R12 Strong blue	60
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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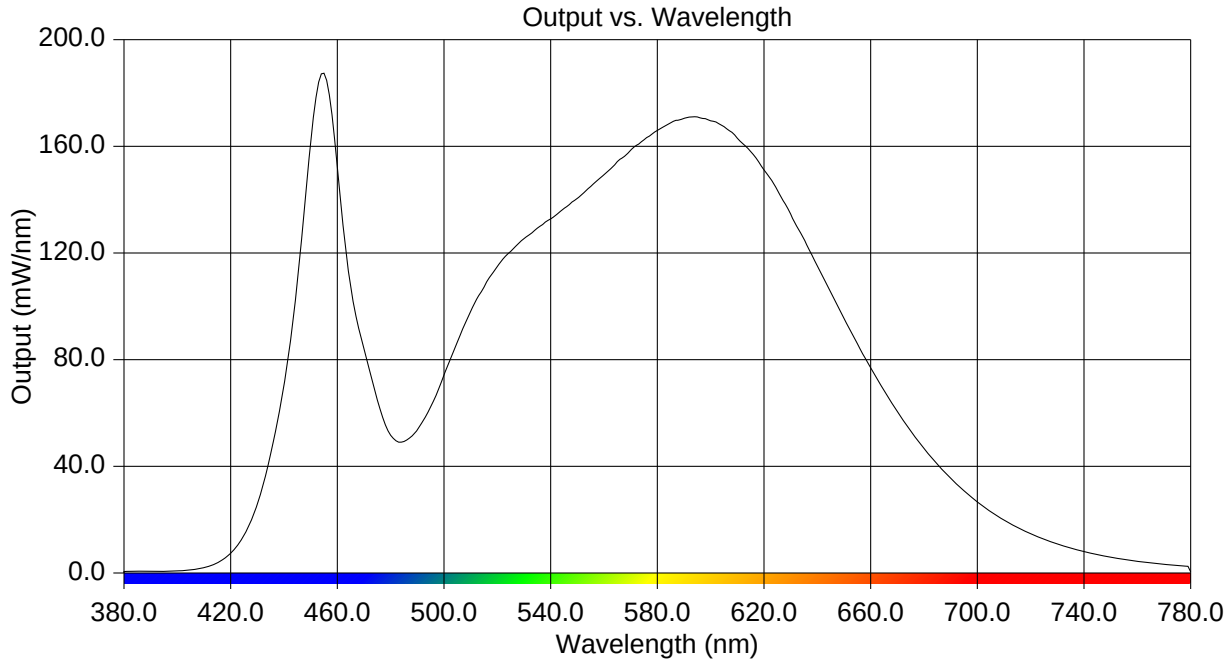
RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	0.542	515	107.175	650	95.448
385	0.637	520	114.983	655	86.035
390	0.611	525	120.583	660	77.041
395	0.653	530	125.368	665	68.442
400	0.813	535	129.319	670	60.626
405	1.149	540	132.792	675	53.301
410	1.968	545	136.703	680	46.618
415	3.836	550	140.442	685	40.814
420	7.449	555	144.926	690	35.512
425	14.140	560	149.268	695	30.833
430	25.889	565	154.282	700	26.668
435	44.703	570	158.497	705	23.013
440	70.934	575	162.446	710	19.858
445	108.839	580	165.994	715	17.066
450	161.092	585	168.817	720	14.706
455	187.415	590	170.489	725	12.694
460	152.211	595	171.023	730	10.834
465	107.326	600	169.562	735	9.340
470	83.836	605	167.394	740	8.008
475	64.879	610	163.034	745	6.916
480	51.635	615	158.050	750	5.941
485	49.313	620	151.156	755	5.109
490	53.637	625	143.686	760	4.386
495	62.339	630	134.602	765	3.778
500	74.241	635	125.195	770	3.244
505	86.609	640	115.171	775	2.813
510	97.989	645	105.243	780	0.423



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CIE Chromaticity Diagram