RAB LIGHTING

NVLAP LAB CODE: 201058-0

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REPORT NUMBER: RAB03428 PAGE: 1 OF 9
ISSUE DATE: 05/25/17 DATE SAMPLE TESTED: 05/25/17
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RAIL225NW/480/D10, RAILP225NW/480/D10 (Standard Distribution) (ALSO APPLIES TO 347 RCL)
LUMINAIRE: EXTRUDED METAL HOUSING WITH HEAT SINK FINS, TWO WHITE CIRCUIT BOARD WITH THREE HUNDRED LEDS ON EACH BOARD, METAL REFLECTOR WITH SPECULAR FINISH, FLAT TRANSLUCENT LENS WITH FROSTED SIDE IN.
LAMPS: SIX HUNDRED LIGHT EMITTING DIODES (LEDS).
(SEE PAGE 2 FOR MORE INFORMATION)

CANDELA DISTRIBUTION

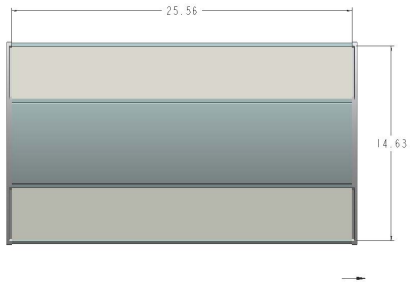
	0.0	45.0	90.0	135.0	180.0	FLUX
0	10790	10790	10790	10790	10790	
5	10697	10723	10764	10735	10714	1018
15	10167	10153	10154	10191	10233	2866
25	9154	9052	8969	9114	9240	4181
35	7752	7572	7407	7640	7853	4760
45	6120	5897	5697	5967	6229	4588
55	4489	4234	4047	4294	4544	3835
65	2874	2725	2567	2772	2960	2719
75	1387	1343	1285	1380	1473	1456
85	230	407	509	420	278	466
90	0	153	251	169	9	
95	1	16	68	23	2	49
105	2	2	3	3	3	3
115	2	2	3	3	3	3
125	3	3	3	3	4	3
135	4	4	4	4	5	3
145	5	5	6	6	6	3
155	6	6	7	7	7	3
165	7	7	8	8	8	2
175	7	8	10	9	9	1
180	9	9	9	9	9	

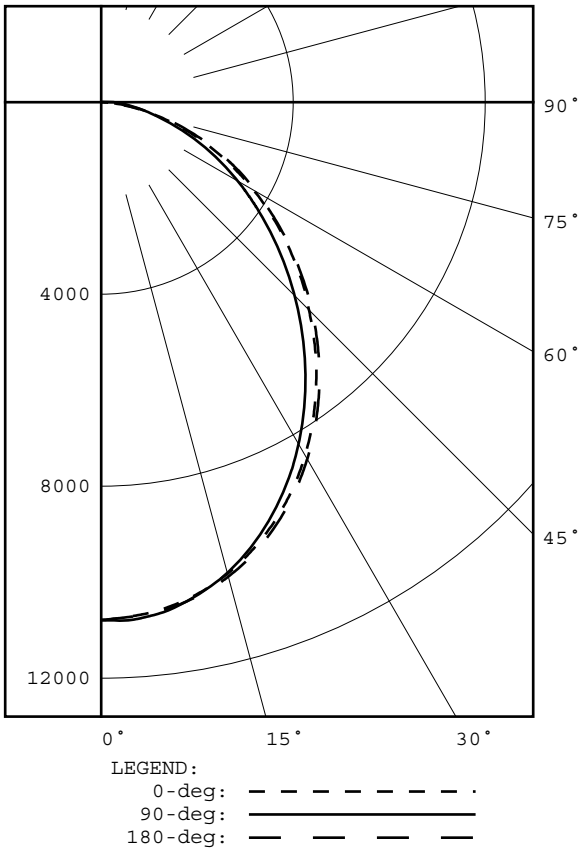
ZONAL LUMEN SUMMARY

ZONE	LUMENS	%FIXT
0- 30	8065	31.1
0- 40	12825	49.4
0- 60	21248	81.9
0- 90	25889	99.7
90-120	55	0.2
90-130	58	0.2
90-150	64	0.2
90-180	70	0.3
0-180	25959	100.0

TOTAL INPUT WATTS = 199.8
EFFICACY = 129.9 Lm/W
CIE TYPE - DIRECT

PLANE	: 0-DEG	90-DEG	180-DEG
SPACING CRITERIA :	1.2	1.1	1.2





Checked	X.CAO
Approved	D.WANG-MUNSON

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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 = 199.77 W AT 347.0 VAC.
LED DRIVER: 2X RDD-096-A3600-240C
TEST PROCEDURE: IESNA LM-79-08
LM-80 DATA AVAILABLE FROM MANUFACTURER FOR SOLID STATE SOURCE
AMBIENT: 24.8
ACCREDITED LABORATORY CODE 201058-0

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PLANE	: 0-DEG	90-DEG
BEAM ANGLE (50%)	: 99.3 X	93.5 DEGREES
FIELD ANGLE (10%)	: 155.2 X	154.3 DEGREES

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PLANE : 0-DEG 90-DEG
LUMINOUS LENGTH :25.560 14.630

LUMINANCE DATA IN CANDELA/SQ METER

ANGLE IN DEG	AVERAGE 0-DEG	AVERAGE 90-DEG	AVERAGE 180-DEG
45	35862.	33383.	36501.
55	32429.	29236.	32826.
65	28178.	25168.	29021.
75	22205.	20572.	23582.
85	10935.	24199.	13217.

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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	10790	10790	10790	10790	10790	10790	10790	10790	10790
5.0	10697	10713	10723	10753	10764	10758	10735	10721	10714
10.0	10499	10509	10509	10526	10532	10544	10542	10539	10539
15.0	10167	10172	10153	10157	10154	10181	10191	10222	10233
20.0	9713	9707	9658	9629	9617	9659	9706	9785	9796
25.0	9154	9133	9052	8999	8969	9039	9114	9225	9240
30.0	8496	8465	8346	8267	8226	8305	8412	8561	8584
35.0	7752	7731	7572	7472	7407	7508	7640	7816	7853
40.0	6957	6907	6748	6633	6556	6670	6817	7007	7059
45.0	6120	6088	5897	5778	5697	5809	5967	6162	6229
50.0	5315	5235	5052	4931	4855	4961	5114	5321	5382
55.0	4489	4427	4234	4113	4047	4141	4294	4489	4544
60.0	3671	3618	3465	3352	3283	3366	3518	3673	3721
65.0	2874	2833	2725	2610	2567	2640	2772	2890	2960
70.0	2115	2081	2005	1922	1886	1934	2049	2135	2197
75.0	1387	1375	1343	1305	1285	1326	1380	1446	1473
80.0	738	757	785	814	829	831	818	826	808
85.0	230	294	407	481	509	494	420	335	278
90.0	0	58	153	225	251	235	169	77	9
95.0	1	1	16	51	68	56	23	2	2
100.0	2	2	2	3	3	3	3	2	2
105.0	2	2	2	3	3	3	3	3	3
110.0	2	2	3	3	3	3	3	3	3
115.0	2	2	2	3	3	3	3	3	3
120.0	3	3	3	3	3	3	3	3	3
125.0	3	3	3	3	3	3	3	3	4
130.0	3	3	3	3	4	4	4	4	4
135.0	4	4	4	4	4	4	4	4	5
140.0	4	5	5	5	5	5	5	5	5
145.0	5	5	5	6	6	6	6	6	6
150.0	5	5	5	6	6	6	6	6	6
155.0	6	6	6	7	7	7	7	7	7
160.0	6	6	6	7	7	7	7	7	7
165.0	7	7	7	8	8	8	8	8	8
170.0	7	7	8	8	9	9	8	8	8
175.0	7	8	8	9	10	9	9	9	9
180.0	9	9	9	9	9	9	9	9	9

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ZONAL LUMEN SUMMARY

0- 5	257.
5- 10	761.
10- 15	1228.
15- 20	1637.
20- 25	1969.
25- 30	2212.
30- 35	2356.
35- 40	2403.
40- 45	2357.
45- 50	2231.
50- 55	2039.
55- 60	1796.
60- 65	1515.
65- 70	1204.
70- 75	881.
75- 80	575.
80- 85	321.
85- 90	145.
90- 95	43.
95-100	6.
100-105	1.
105-110	1.
110-115	1.
115-120	1.
120-125	1.
125-130	2.
130-135	2.
135-140	2.
140-145	2.
145-150	2.
150-155	2.
155-160	1.
160-165	1.
165-170	1.
170-175	1.
175-180	0.

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5-DEGREE ZONAL LUMEN SUMMARY

0- 5	257
5- 10	761
10- 15	1228
15- 20	1637
20- 25	1969
25- 30	2212
30- 35	2356
35- 40	2403
40- 45	2357
45- 50	2231
50- 55	2039
55- 60	1796
60- 65	1515
65- 70	1204
70- 75	881
75- 80	575
80- 85	321
85- 90	145
90- 95	43
95-100	6
100-105	1
105-110	1
110-115	1
115-120	1
120-125	1
125-130	2
130-135	2
135-140	2
140-145	2
145-150	2
150-155	2
155-160	1
160-165	1
165-170	1
170-175	1
175-180	0

10-DEGREE ZONAL LUMEN SUMMARY

0- 10	1018
0- 20	3884
0- 30	8065
0- 40	12825
0- 50	17413
0- 60	21248
0- 70	23967
0- 80	25423
0- 90	25889
0-100	25938
0-110	25941
0-120	25944
0-130	25947
0-140	25950
0-150	25953
0-160	25956
0-170	25959
0-180	25959

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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	106	102	99	95	98	95	92	94	92	89	91	89	87	85
2	100	92	85	80	97	90	84	79	86	81	77	83	79	75	80	77	74	71
3	91	81	73	67	89	80	72	67	77	71	65	74	69	64	71	67	63	61
4	84	72	64	58	82	71	63	57	69	62	56	66	60	56	64	59	55	53
5	77	65	56	50	75	64	56	50	62	55	49	60	54	49	58	52	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	42	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	29	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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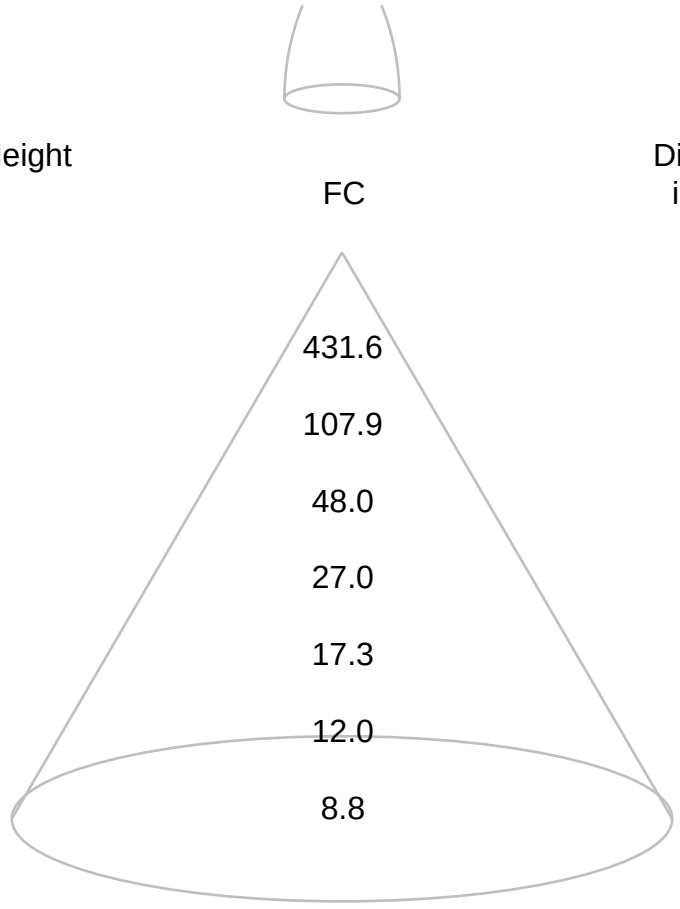
CONE OF LIGHT DIAGRAM

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



Mounting Height in feet	FC	Diameter in feet
5.0	431.6	5.8
10.0	107.9	11.6
15.0	48.0	17.5
20.0	27.0	23.3
25.0	17.3	29.1
30.0	12.0	34.9
35.0	8.8	40.8

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

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DATE: 05/25/2017
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RAIL225NW/480/D10, RAILP225NW/480/D10 (Standard Distribution) (ALSO APPLIES TO 347 RCL)

ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

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

LAMP: SIX HUNDRED LIGHT EMITTING DIODES (LEDS).

DRIVER: 2X RDD-096-A3600-240C

OBJECT OF TEST: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED AT THE RATED INPUT VOLTAGES (347.0 AND 480.0 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	05/19/18
RAB 2.0 meter Diameter Integrating Sphere, 4PI Geometry	05/19/18

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 (480.0 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)	25959 *
SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.3768
Chromaticity Ordinate y	0.3694
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2257
Chromaticity Ordinate v'	0.4978
Correlated Color Temp CCT (K)	4046
ANSI C78.377-2008 Duv	-0.002
Total Radiant Flux (milliWatts)	76895 *
ELECTRICAL	
Input Voltage (Volts AC)	347.0
Input Current (Amps AC)	0.581
Input Power (Watts)	199.8
Input Power Factor (%)	99.1
Input Current THD (%)	10.5
Input Voltage THD (%)	0.2
EFFICACY (Lumens/Watt)	129.9
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	480.0
Input Current (Amps AC)	0.430
Input Power (Watts)	199.1
Input Power Factor (%)	96.4
Input Current THD (%)	12.8
Input Voltage THD (%)	0.2
Off-State Power (Watts)	0.0

COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	78
R1 Light greyish red	75
R2 Dark greyish yellow	87
R3 Strong yellowish green	93
R4 Moderate yellowish green	74
R5 Light bluish green	76
R6 Light blue	81
R7 Light violet	81
R8 Light reddish purple	55
R9 Strong red	-16
R10 Strong yellow	68
R11 Strong green	71
R12 Strong blue	54
R13 Light yellowish pink (skin)	78
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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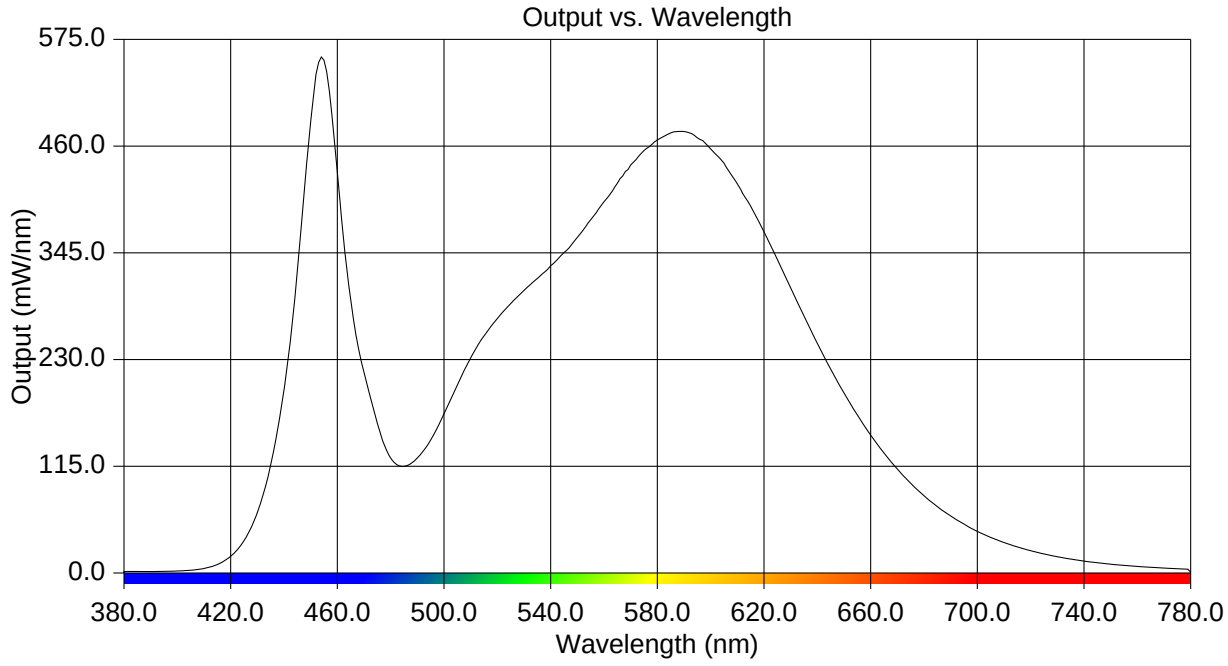
RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	1.510	515	255.536	650	193.900
385	1.558	520	274.636	655	170.508
390	1.578	525	290.485	660	148.786
395	1.762	530	304.671	665	129.175
400	2.152	535	317.497	670	111.987
405	2.935	540	331.242	675	96.694
410	4.841	545	345.549	680	83.190
415	9.088	550	361.649	685	71.432
420	17.985	555	380.730	690	61.409
425	34.807	560	400.177	695	52.826
430	64.991	565	420.144	700	44.922
435	116.666	570	439.836	705	38.388
440	197.687	575	455.445	710	32.797
445	325.236	580	466.959	715	27.950
450	486.308	585	474.408	720	23.984
455	552.779	590	476.019	725	20.507
460	432.165	595	469.144	730	17.540
465	294.683	600	457.008	735	15.077
470	215.746	605	441.785	740	12.850
475	161.416	610	419.825	745	11.058
480	124.270	615	395.488	750	9.483
485	114.945	620	367.878	755	8.128
490	123.733	625	338.061	760	7.009
495	143.375	630	307.154	765	6.044
500	171.566	635	277.110	770	5.245
505	202.689	640	247.390	775	4.586
510	232.077	645	219.791	780	0.689



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CIE Chromaticity Diagram