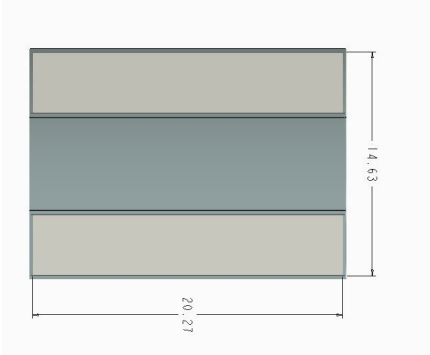
RAB LIGHTING

NVLAP LAB CODE: 201058-0

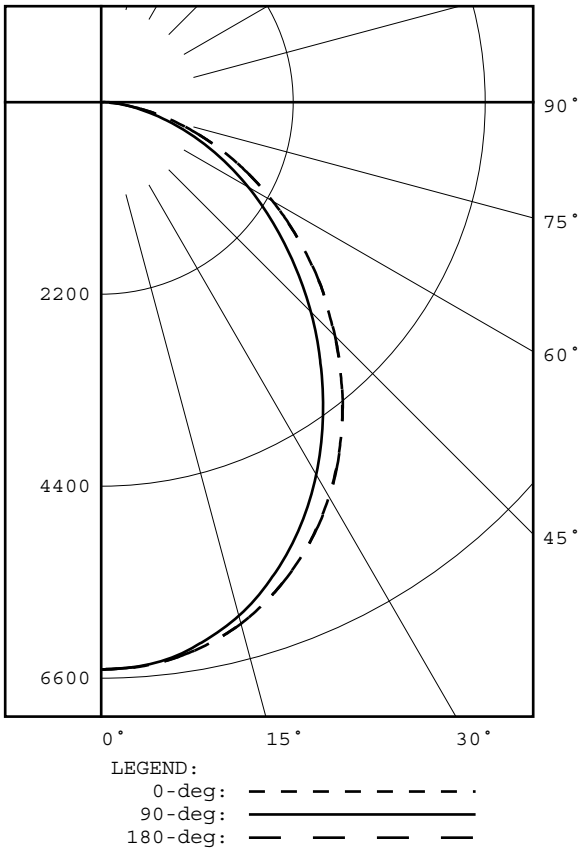
170 Ludlow Ave, Northvale, NJ 07647 • 888 722-1000 • rabweb.com

REPORT NUMBER: RAB00852 PAGE: 1 OF 8
ISSUE DATE: 05/05/15 DATE SAMPLE TESTED: 05/05/15
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RAIL150NW
LUMINAIRE: EXTRUDED METAL HOUSING WITH HEAT SINK FINS, FOUR WHITE CIRCUIT BOARD WITH NINETY SIX LEDS ON EACH BOARD, METAL REFLECTOR WITH SPECULAR FINISH,
LAMPS: THREE HUNDRED AND EIGHTY FOUR LIGHT EMITTING DIODES (LEDS).
NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED.
TOTAL INPUT WATTS = 147.63 AT 120.0 VAC.
TEST PROCEDURE: IESNA LM-79-08
(SEE PAGE 2 FOR MORE INFORMATION)



CANDELA DISTRIBUTION

	0.0	45.0	90.0	135.0	180.0	FLUX
0	6500	6500	6500	6500	6500	
5	6470	6467	6462	6464	6467	613
15	6186	6144	6094	6141	6187	1728
25	5604	5500	5382	5495	5608	2526
35	4775	4609	4428	4606	4780	2876
45	3784	3581	3396	3591	3790	2768
55	2770	2581	2397	2580	2774	2309
65	1789	1642	1515	1641	1789	1627
75	890	810	741	811	887	862
85	176	199	218	200	173	237
90	8	57	82	54	9	
95	1	4	12	3	2	14
105	2	2	3	3	3	3
115	2	2	3	3	3	3
125	2	3	3	4	4	3
135	3	4	5	5	5	3
145	4	5	6	6	6	4
155	5	6	7	7	7	3
165	6	6	7	8	8	2
175	6	7	8	8	8	1
180	8	8	8	8	8	



ZONAL LUMEN SUMMARY

ZONE	LUMENS	%FIXT
0- 30	4867	31.2
0- 40	7743	49.7
0- 60	12820	82.3
0- 90	15547	99.8
90-120	20	0.1
90-130	23	0.1
90-150	30	0.2
90-180	35	0.2
0-180	15582	100.0

TOTAL INPUT WATTS = 147.6
EFFICACY = 105.6 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*

REPORT NUMBER: RAB00852 PAGE: 2 OF 8
ISSUE DATE: 05/05/15 DATE SAMPLE TESTED: 05/05/15
PREPARED FOR: RAB LIGHTING INC.

ADDITIONAL INFORMATION

TEST DISTANCE: 28.25 FEET
DRIVER:2 X RD-075-A1400
LM-80 DATA AVAILABLE FROM MANUFACTURER FOR SOLID STATE SOURCE
ACCREDITED LABORATORY CODE 201058-0

REPORT NUMBER: RAB00852 PAGE: 3 OF 8
ISSUE DATE: 05/05/15 DATE SAMPLE TESTED: 05/05/15
PREPARED FOR: RAB LIGHTING INC.

PLANE	: 0-DEG	90-DEG
BEAM ANGLE (50%)	: 100.8 X	92.8 DEGREES
FIELD ANGLE (10%)	: 155.8 X	152.8 DEGREES

REPORT NUMBER: RAB00852 PAGE: 4 OF 8
ISSUE DATE: 05/05/15 DATE SAMPLE TESTED: 05/05/15
PREPARED FOR: RAB LIGHTING INC.

CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0	112.5	135.0	157.5	180.0
0.0	6500	6500	6500	6500	6500	6500	6500	6500	6500
5.0	6470	6473	6467	6458	6462	6456	6464	6466	6467
10.0	6364	6365	6350	6323	6318	6318	6346	6356	6364
15.0	6186	6179	6144	6100	6094	6097	6141	6168	6187
20.0	5926	5911	5853	5782	5770	5780	5850	5901	5928
25.0	5604	5580	5500	5405	5382	5401	5495	5569	5608
30.0	5219	5184	5080	4964	4927	4957	5077	5172	5227
35.0	4775	4731	4609	4471	4428	4468	4606	4719	4780
40.0	4291	4240	4104	3970	3909	3965	4102	4229	4298
45.0	3784	3722	3581	3447	3396	3439	3591	3713	3790
50.0	3289	3215	3076	2931	2886	2940	3086	3204	3294
55.0	2770	2704	2581	2446	2397	2447	2580	2702	2774
60.0	2269	2207	2088	1981	1948	1982	2100	2203	2272
65.0	1789	1728	1642	1543	1515	1541	1641	1727	1789
70.0	1327	1278	1209	1131	1109	1129	1210	1274	1325
75.0	890	857	810	755	741	755	811	850	887
80.0	493	478	462	435	434	436	461	472	490
85.0	176	178	199	210	218	211	200	175	173
90.0	8	27	57	74	82	72	54	24	9
95.0	1	1	4	10	12	9	3	2	2
100.0	1	1	2	2	3	3	3	3	3
105.0	2	2	2	3	3	3	3	3	3
110.0	1	2	2	3	3	3	3	3	3
115.0	2	2	2	3	3	3	3	3	3
120.0	2	2	2	3	3	3	3	4	3
125.0	2	2	3	3	3	4	4	4	4
130.0	3	3	3	4	4	4	5	5	4
135.0	3	4	4	4	5	5	5	5	5
140.0	4	4	4	5	5	6	6	6	6
145.0	4	5	5	6	6	6	6	6	6
150.0	5	5	5	6	6	6	7	7	7
155.0	5	6	6	6	7	7	7	7	7
160.0	6	6	6	7	7	7	7	7	7
165.0	6	6	6	7	7	8	8	8	8
170.0	7	7	7	8	8	8	8	8	8
175.0	6	7	7	8	8	8	8	8	8
180.0	8	8	8	8	8	8	8	8	8

REPORT NUMBER: RAB00852 PAGE: 5 OF 8
ISSUE DATE: 05/05/15 DATE SAMPLE TESTED: 05/05/15
PREPARED FOR: RAB LIGHTING INC.

ZONAL LUMEN SUMMARY

0- 5	155.
5- 10	458.
10- 15	740.
15- 20	988.
20- 25	1189.
25- 30	1337.
30- 35	1424.
35- 40	1452.
40- 45	1423.
45- 50	1346.
50- 55	1229.
55- 60	1080.
60- 65	907.
65- 70	720.
70- 75	526.
75- 80	336.
80- 85	174.
85- 90	63.
90- 95	12.
95-100	2.
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.

REPORT NUMBER: RAB00852 PAGE: 6 OF 8
ISSUE DATE: 05/05/15 DATE SAMPLE TESTED: 05/05/15
PREPARED FOR: RAB LIGHTING INC.

5-DEGREE ZONAL LUMEN SUMMARY

0- 5	155
5- 10	458
10- 15	740
15- 20	988
20- 25	1189
25- 30	1337
30- 35	1424
35- 40	1452
40- 45	1423
45- 50	1346
50- 55	1229
55- 60	1080
60- 65	907
65- 70	720
70- 75	526
75- 80	336
80- 85	174
85- 90	63
90- 95	12
95-100	2
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	613
0- 20	2341
0- 30	4867
0- 40	7743
0- 50	10511
0- 60	12820
0- 70	14447
0- 80	15309
0- 90	15547
0-100	15561
0-110	15563
0-120	15566
0-130	15569
0-140	15573
0-150	15576
0-160	15579
0-170	15581
0-180	15582

REPORT NUMBER: RAB00852 PAGE: 7 OF 8
ISSUE DATE: 05/05/15 DATE SAMPLE TESTED: 05/05/15

PREPARED FOR: RAB LIGHTING INC.

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	103	99	96	98	95	93	94	92	90	91	89	87	85
2	100	92	86	80	97	90	84	79	87	82	77	83	79	76	80	77	74	72
3	92	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	57	66	61	56	64	59	55	53
5	78	65	57	50	76	64	56	50	62	55	49	60	54	49	58	53	48	46
6	72	59	50	44	70	58	50	44	56	49	44	55	48	43	53	47	43	41
7	67	54	45	39	65	53	45	39	51	44	39	50	43	38	49	43	38	36
8	62	49	41	35	61	48	41	35	47	40	35	46	39	35	45	39	34	33
9	58	45	37	32	57	45	37	32	43	36	32	42	36	31	41	36	31	29
10	55	42	34	29	53	41	34	29	40	33	29	39	33	29	38	33	29	27

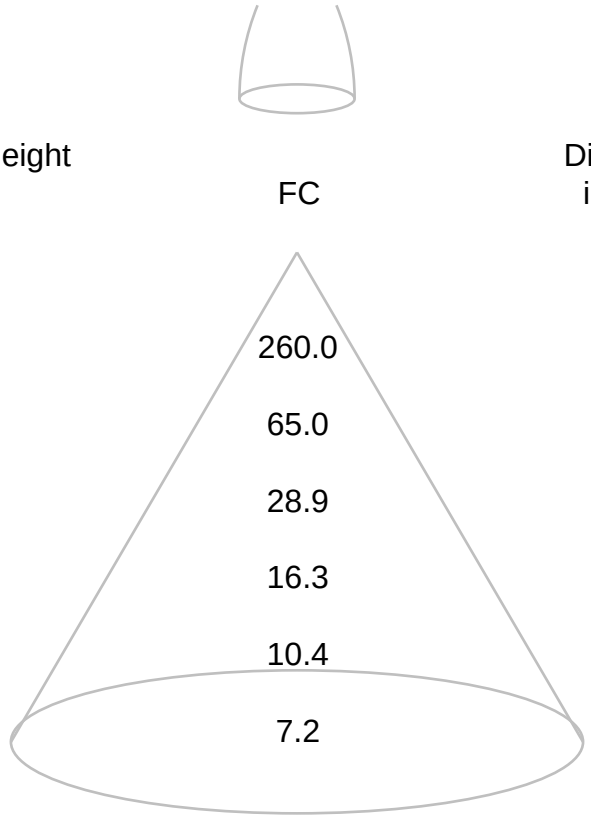
ALL CANDELA, LUMENS, LUMINANCE, AND VCP VALUES IN THIS REPORT ARE BASED ON ABSOLUTE PHOTOMETRY. THE COEFFICIENT OF UTILIZATION VALUES ARE BASED ON THE TOTAL ABSOLUTE LUMEN OUTPUT OF THIS LUMINAIRE SAMPLE.

REPORT NUMBER: RAB00852
ISSUE DATE: 05/05/15
PREPARED FOR: RAB LIGHTING INC.

DATE SAMPLE TESTED: 05/05/15

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	260.0	5.8
10.0	65.0	11.7
15.0	28.9	17.5
20.0	16.3	23.4
25.0	10.4	29.2
30.0	7.2	35.0

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

RAB LIGHTING

NVLAP LAB CODE: 201058-0

170 Ludlow Ave, Northvale, NJ 07647 • 888 722-1000 • rabweb.com

REPORT NUMBER: RAB00855
DATE: 5/15/2015
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RAIL150NW

ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

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

LAMP: THREE HUNDRED AND EIGHTY FOUR LIGHT EMITTING DIODES (LEDS).

DRIVER: 2 X RD-075-A1400

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

REPORT NUMBER: RAB00855
DATE: 5/15/2015
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RAIL150NW

RESULTS:

PHOTOMETRIC	
Total Integrated Flux (lumens)	15582 *
SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.3809
Chromaticity Ordinate y	0.3771
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2253
Chromaticity Ordinate v'	0.5018
Correlated Color Temp CCT (K)	3989
ANSI C78.377-2008 Duv	0.000
Total Radiant Flux (milliWatts)	48064 *
ELECTRICAL	
Input Voltage (Volts AC)	120.0
Input Current (Amps AC)	1.23
Input Power (Watts)	147.6
Input Power Factor (%)	99.6
Input Current THD (%)	5.2
Input Voltage THD (%)	0.2
EFFICACY (Lumens/Watt)	105.6
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	277.0
Input Current (Amps AC)	0.556
Input Power (Watts)	144.6
Input Power Factor (%)	93.9
Input Current THD (%)	10.8
Input Voltage THD (%)	0.2
Off-State Power (Watts)	0.0

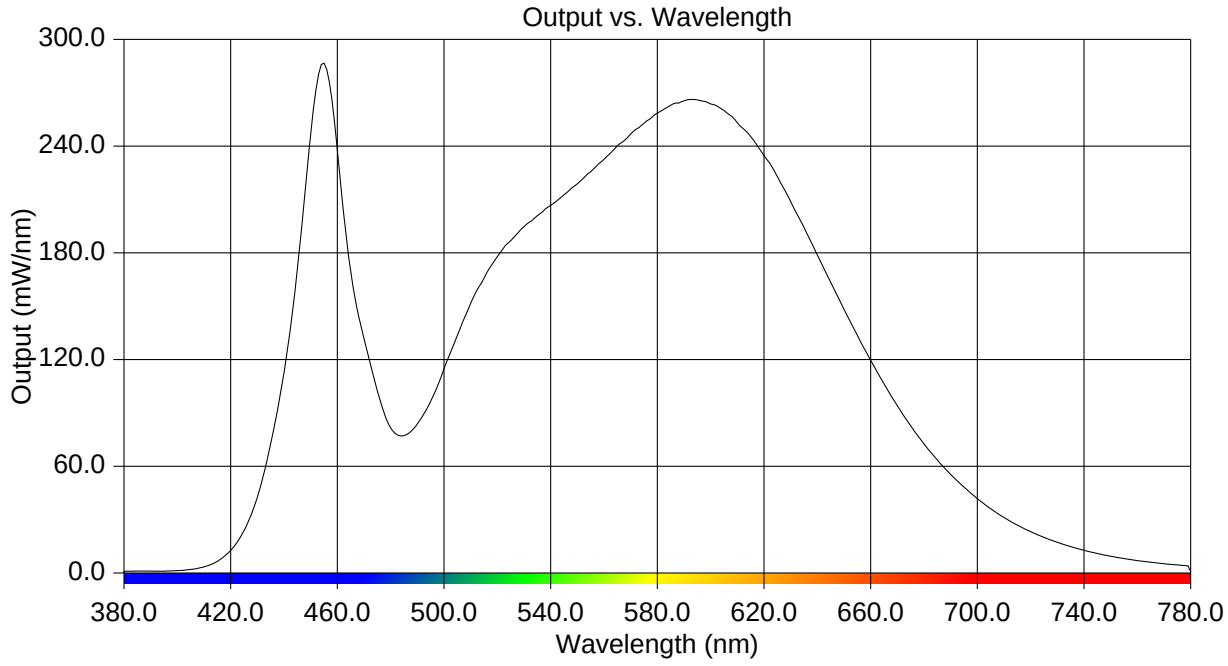
COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	84
R1 Light greyish red	82
R2 Dark greyish yellow	90
R3 Strong yellowish green	94
R4 Moderate yellowish green	82
R5 Light bluish green	82
R6 Light blue	85
R7 Light violet	87
R8 Light reddish purple	67
R9 Strong red	16
R10 Strong yellow	74
R11 Strong green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

REPORT NUMBER: RAB00855
DATE: 5/15/2015
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RAIL150NW

RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	0.901	515	165.828	650	148.337
385	1.010	520	177.914	655	133.730
390	0.995	525	186.879	660	119.778
395	1.068	530	194.851	665	106.471
400	1.337	535	200.974	670	94.147
405	1.942	540	206.786	675	82.840
410	3.349	545	212.773	680	72.508
415	6.554	550	218.856	685	63.575
420	12.720	555	225.666	690	55.427
425	23.801	560	232.562	695	48.344
430	42.601	565	240.336	700	41.847
435	72.737	570	246.869	705	36.193
440	113.419	575	252.934	710	31.201
445	169.843	580	258.728	715	26.847
450	246.586	585	263.084	720	23.258
455	286.801	590	265.561	725	20.002
460	238.088	595	266.141	730	17.240
465	169.609	600	263.827	735	14.785
470	131.711	605	260.167	740	12.784
475	102.455	610	253.249	745	10.960
480	81.720	615	245.543	750	9.471
485	77.296	620	234.767	755	8.123
490	83.656	625	223.147	760	6.997
495	96.646	630	208.945	765	6.031
500	114.816	635	194.386	770	5.207
505	133.582	640	178.861	775	4.519
510	151.442	645	163.623	780	0.679



REPORT NUMBER: RAB00855
DATE: 5/15/2015
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RAIL150NW

CIE Chromaticity Diagram