

REPORT NUMBER: RAB00970

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ISSUE DATE: 07/29/15

DATE SAMPLE TESTED: 07/29/15

PREPARED FOR: RAB LIGHTING INC.

CATALOG NUMBER: SHARK4-50NW/D10 (STANDARD DISTRIBUTION)

LUMINAIRE: FABRICATED WHITE PLASTIC HOUSING, PERFORATED WHITE METAL HEAT SINK, 2 WHITE CIRCUIT BOARDS EACH WITH 64 LEDS, FROSTED POLYCARBONATE LENS ENCLOSURE.

LAMPS: ONE HUNDRED AND TWENTY EIGHT WHITE EMITTING DIODES (LEDs), TILTED 15-DEGREE FROM VERTICAL BASE-UP POSITION.

TOTAL INPUT WATTS = 47.843 AT 277.0 VOLTS

LED DRIVERS: RD-052-A1050-C-089C

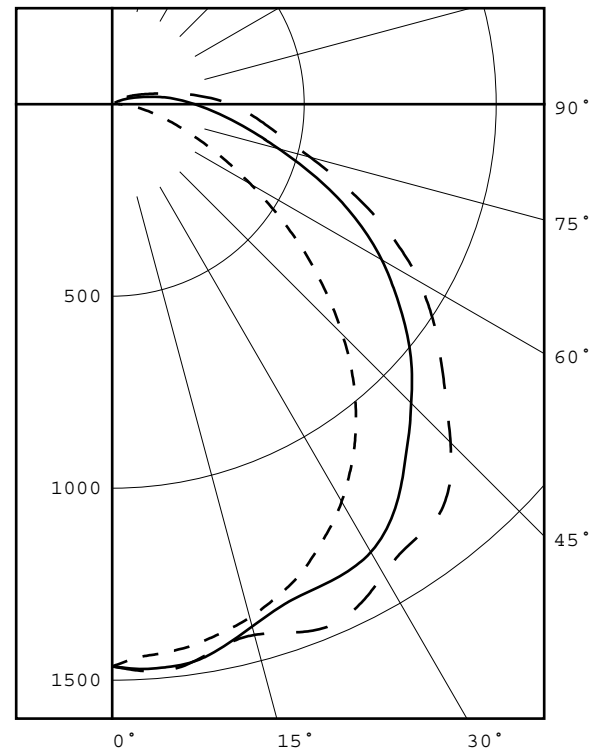
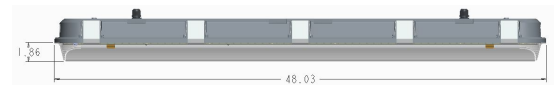
(SEE PAGE 2 FOR MORE INFORMATION)

CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0
0	1464	1464	1464	1464	1464
5	1436	1449	1473	1482	1480
15	1384	1403	1408	1419	1431
25	1273	1282	1366	1446	1464
35	1098	1141	1285	1340	1380
45	848	961	1101	1230	1246
55	555	695	913	1010	1029
65	299	434	696	780	797
75	138	242	449	525	534
85	48	122	277	352	371
90	18	85	214	287	304
95	15	59	163	221	235
105	11	19	69	99	105
115	8	8	23	43	48
125	5	5	5	11	17
135	4	4	4	4	4
145	4	4	3	4	4
155	4	4	3	3	3
165	4	4	3	3	3
175	5	4	3	3	3
180	4	4	4	4	4

FLUX

139
400
629
784
835
763
609
414
264
155
68
26
8
3
2
2
1
0



LEGEND:

0-deg: - - - - -
 45-deg: _____
 90-deg: - . - . - .

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%FIXT
0- 30	1168	22.9
0- 40	1951	38.2
0- 60	3550	69.6
0- 90	4837	94.8
90-120	249	4.9
90-130	257	5.0
90-150	262	5.1
90-180	265	5.2
0-180	5102	100.0

TOTAL INPUT WATTS = 47.8

EFFICACY = 106.7 Lm/W

CIE TYPE - DIRECT

PLANE : 0-DEG 90-DEG

SPACING CRITERIA : 1.2 1.4

Checked X.CAO

Approved D.WANG-MUNSON

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ADDITIONAL INFORMATION

NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED AT RATED INPUT
VOLTAGE TO THE LED DRIVERS.
TEST PROCEDURE: IESNA LM-79-08
TEST DISTANCE = 28.25 FEET
ACCREDITED LABORATORY CODE 201058-0

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PLANE : 0-DEG 90-DEG
BEAM ANGLE (50%) : 97.4 X 134.1 DEGREES
FIELD ANGLE (10%) : 148.4 X 202.2 DEGREES

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CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0
0.0	1464	1464	1464	1464	1464
5.0	1436	1449	1473	1482	1480
10.0	1416	1434	1456	1454	1453
15.0	1384	1403	1408	1419	1431
20.0	1338	1351	1373	1438	1462
25.0	1273	1282	1366	1446	1464
30.0	1195	1211	1347	1400	1414
35.0	1098	1141	1285	1340	1380
40.0	983	1061	1190	1306	1349
45.0	848	961	1101	1230	1246
50.0	702	836	1014	1114	1128
55.0	555	695	913	1010	1029
60.0	417	560	811	904	924
65.0	299	434	696	780	797
70.0	206	330	571	647	659
75.0	138	242	449	525	534
80.0	87	174	354	422	437
85.0	48	122	277	352	371
90.0	18	85	214	287	304
95.0	15	59	163	221	235
100.0	13	37	110	154	162
105.0	11	19	69	99	105
110.0	10	9	42	66	72
115.0	8	8	23	43	48
120.0	6	6	7	26	31
125.0	5	5	5	11	17
130.0	5	5	5	5	5
135.0	4	4	4	4	4
140.0	4	4	4	4	4
145.0	4	4	3	4	4
150.0	4	3	3	3	3
155.0	4	4	3	3	3
160.0	4	4	3	3	3
165.0	4	4	3	3	3
170.0	4	4	3	3	3
175.0	5	4	3	3	3
180.0	4	4	4	4	4

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ZONAL LUMEN SUMMARY

0- 5	35.
5- 10	104.
10- 15	169.
15- 20	231.
20- 25	289.
25- 30	340.
30- 35	378.
35- 40	406.
40- 45	420.
45- 50	415.
50- 55	396.
55- 60	367.
60- 65	328.
65- 70	281.
70- 75	230.
75- 80	184.
80- 85	147.
85- 90	117.
90- 95	90.
95-100	65.
100-105	42.
105-110	26.
110-115	16.
115-120	10.
120-125	5.
125-130	3.
130-135	2.
135-140	1.
140-145	1.
145-150	1.
150-155	1.
155-160	1.
160-165	1.
165-170	0.
170-175	0.
175-180	0.

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5-DEGREE ZONAL LUMEN SUMMARY

0- 5	35
5- 10	104
10- 15	169
15- 20	231
20- 25	289
25- 30	340
30- 35	378
35- 40	406
40- 45	420
45- 50	415
50- 55	396
55- 60	367
60- 65	328
65- 70	281
70- 75	230
75- 80	184
80- 85	147
85- 90	117
90- 95	90
95-100	65
100-105	42
105-110	26
110-115	16
115-120	10
120-125	5
125-130	3
130-135	2
135-140	1
140-145	1
145-150	1
150-155	1
155-160	1
160-165	1
165-170	0
170-175	0
175-180	0

10-DEGREE ZONAL LUMEN SUMMARY

0- 10	139
0- 20	539
0- 30	1168
0- 40	1951
0- 50	2787
0- 60	3550
0- 70	4159
0- 80	4573
0- 90	4837
0-100	4992
0-110	5060
0-120	5086
0-130	5094
0-140	5097
0-150	5099
0-160	5101
0-170	5102
0-180	5102

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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	118	118	118	118	114	114	114	114	108	108	108	103	103	103	97	97	97	95
1	106	100	96	91	103	98	93	89	92	89	85	88	85	82	83	81	78	76
2	96	87	79	73	93	84	78	72	80	74	69	76	71	67	72	68	65	62
3	87	76	67	60	84	74	66	59	70	63	58	66	61	56	63	58	54	52
4	79	67	58	51	77	65	57	50	62	54	49	59	53	47	56	51	46	44
5	73	59	50	43	70	58	49	43	55	48	42	53	46	41	50	45	40	38
6	67	53	44	38	65	52	43	37	50	42	36	48	41	36	46	40	35	33
7	62	48	39	33	60	47	39	33	45	38	32	43	36	31	41	35	31	29
8	58	44	35	29	56	43	35	29	41	34	28	40	33	28	38	32	28	25
9	54	40	32	26	52	39	31	26	38	31	26	36	30	25	35	29	25	23
10	51	37	29	24	49	36	29	23	35	28	23	34	27	23	32	27	22	21

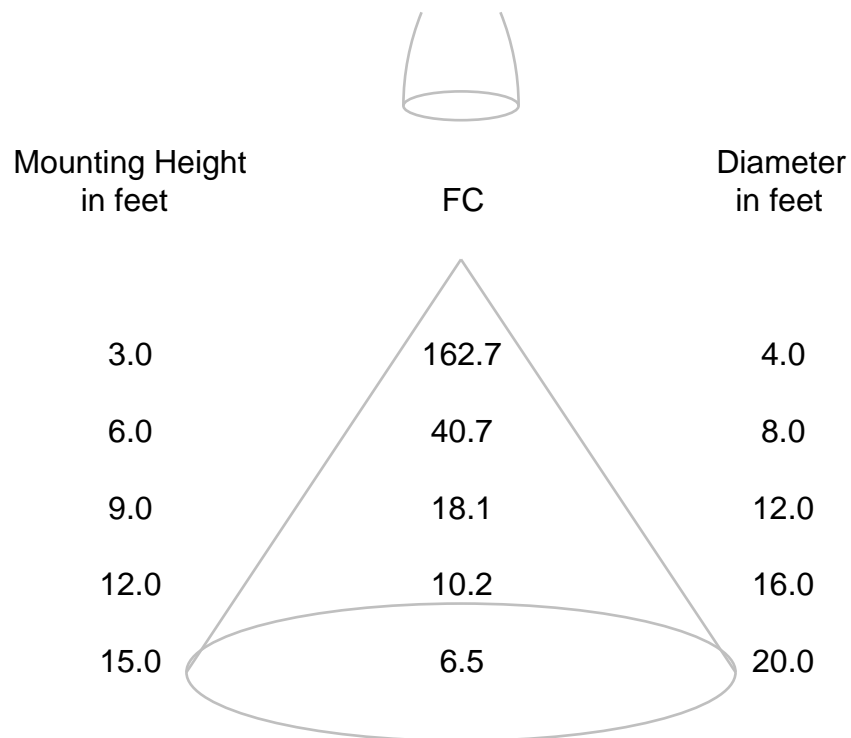
ALL CANDELA, LUMENS, LUMINANCE, AND VCP VALUES IN THIS REPORT ARE BASED ON ABSOLUTE PHOTOMETRY. THE COEFFICIENT OF UTILIZATION VALUES ARE BASED ON THE TOTAL ABSOLUTE LUMEN OUTPUT OF THIS LUMINAIRE SAMPLE.

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CONE OF LIGHT DIAGRAM

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



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: 7/29/2015
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: SHARK4-50NW/D10 (STANDARD DISTRIBUTION)

ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

LUMINAIRE: FABRICATED WHITE PLASTIC HOUSING, PERFORATED WHITE METAL HEAT SINK, 2 WHITE CIRCUIT BOARDS EACH WITH 64 LEDS, FROSTED POLYCARBONATE LENS ENCLOSURE.

LAMP: ONE HUNDRED AND TWENTY EIGHT WHITE EMITTING DIODES (LEDs), TILTED 15-DEGREE FROM VERTICAL BASE-UP POSITION.

DRIVER: RD-052-A1050-C-089C

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:	CHROMA PROGRAMMABLE AC POWER SOURCE MODEL 61602	Calibration Due: N/A
	CHROMA PROGRAMMABLE DIGITAL POWER METER MODEL 66202	3/9/16
	OCEAN OPTICS QE65PRO Spectroradiometer	7/24/16
	RAB 2.0 meter Diameter Integrating Sphere, 4PI Geometry	7/24/16

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	<u>X.CAO</u>
Approved	<u>D.WANG-MUNSON</u> Lighting Engineer

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RESULTS:

PHOTOMETRIC	
Total Integrated Flux (lumens)	5102 *
SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.3833
Chromaticity Ordinate y	0.3798
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2258
Chromaticity Ordinate v'	0.5033
Correlated Color Temp CCT (K)	3946
ANSI C78.377-2008 Duv	0.001
Total Radiant Flux (milliWatts)	15035 *
ELECTRICAL	
Input Voltage (Volts AC)	120.0
Input Current (Amps AC)	0.400
Input Power (Watts)	47.6
Input Power Factor (%)	99.2
Input Current THD (%)	7.6
Input Voltage THD (%)	0.2
EFFICACY (Lumens/Watt)	
	107.2
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	277.0
Input Current (Amps AC)	0.181
Input Power (Watts)	47.8
Input Power Factor (%)	95.3
Input Current THD (%)	8.1
Input Voltage THD (%)	0.2
Off-State Power (Watts)	
	0.0

COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	74
R1 Light greyish red	72
R2 Dark greyish yellow	80
R3 Strong yellowish green	86
R4 Moderate yellowish green	73
R5 Light bluish green	71
R6 Light blue	71
R7 Light violet	83
R8 Light reddish purple	57
R9 Strong red	-15
R10 Strong yellow	52
R11 Strong green	67
R12 Strong blue	41
R13 Light yellowish pink (skin)	73
R14 Moderate olive green (leaf)	91

*NOTE:

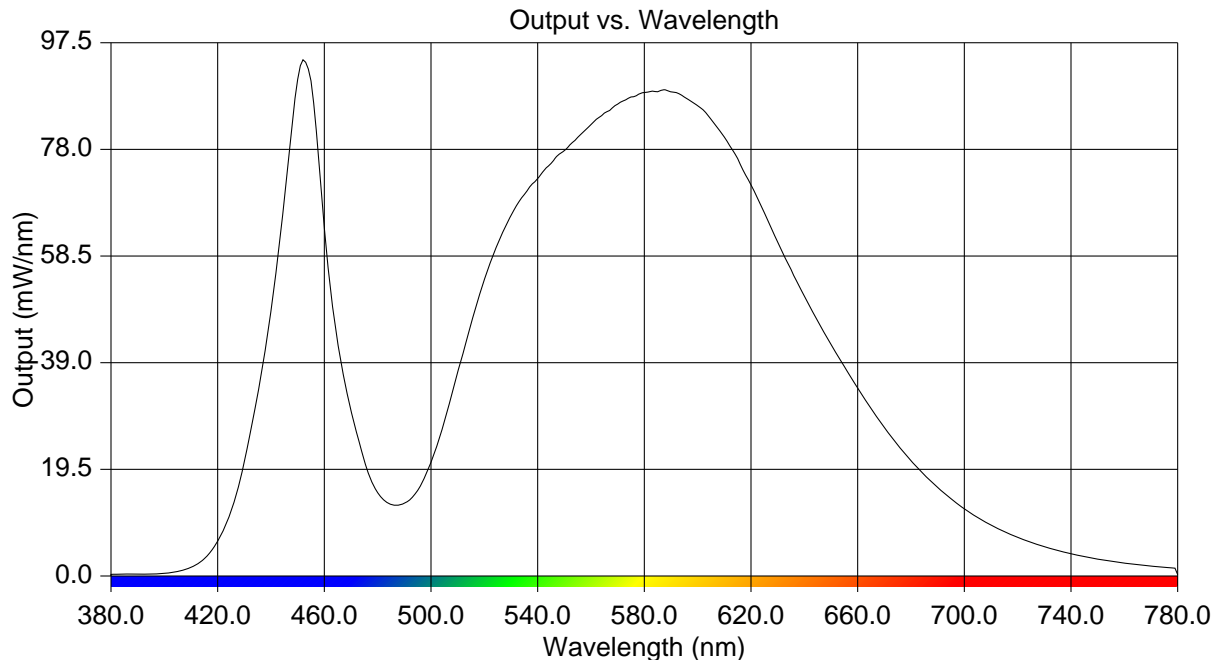
Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even 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	0.294	515	46.105	650	42.367
385	0.304	520	54.101	655	38.302
390	0.320	525	60.715	660	34.359
395	0.380	530	65.878	665	30.619
400	0.520	535	69.741	670	27.137
405	0.812	540	72.638	675	23.930
410	1.540	545	75.410	680	21.107
415	3.168	550	77.747	685	18.490
420	6.341	555	80.179	690	16.175
425	11.795	560	82.493	695	14.130
430	20.804	565	84.627	700	12.287
435	33.266	570	86.264	705	10.687
440	48.364	575	87.571	710	9.290
445	68.792	580	88.429	715	8.104
450	90.773	585	88.527	720	7.080
455	90.518	590	88.540	725	6.164
460	63.924	595	87.553	730	5.358
465	42.393	600	85.960	735	4.672
470	30.425	605	83.529	740	4.046
475	21.084	610	80.240	745	3.537
480	15.212	615	76.316	750	3.102
485	13.118	620	71.549	755	2.705
490	13.271	625	66.439	760	2.367
495	15.637	630	61.043	765	2.062
500	20.744	635	56.057	770	1.807
505	28.201	640	51.142	775	1.589
510	37.214	645	46.617	780	0.242



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CIE Chromaticity Diagram

