RAB LIGHTING

NVLAP LAB CODE: 201058-0

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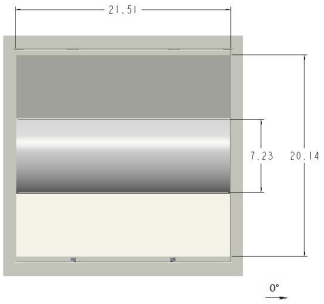
REPORT NUMBER: RAB03220 PAGE: 1 OF 8
ISSUE DATE: 04/20/17 DATE SAMPLE TESTED: 04/20/17
CATALOG NUMBER: RTLED2X2-19W/D10
LUMINAIRE: WHITE PAINTED SHEET METAL HOUSING, 2 WHITE CIRCUIT BOARDS EACH WITH 40 LEDS, MATTE WHITE POLYCARBONATE LENS IN THE CENTER, ROUGH SURFACE FACING OUT. FIXTURE WAS MOUNTED IN Lithonia Lighting Model #2GT8 2 U316 A12 MVOLT GEB10IS HOUSING.
LAMPS: EIGHTY WHITE 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	843	843	843	843	843	
5	838	837	839	841	842	80
15	804	805	809	814	815	228
25	737	739	748	758	761	345
35	645	650	664	680	686	416
45	535	541	560	582	591	434
55	413	420	447	477	490	402
65	288	301	336	364	377	329
75	161	178	207	244	262	222
85	46	61	82	92	92	81
90	1	1	0	0	0	

ZONAL LUMEN SUMMARY

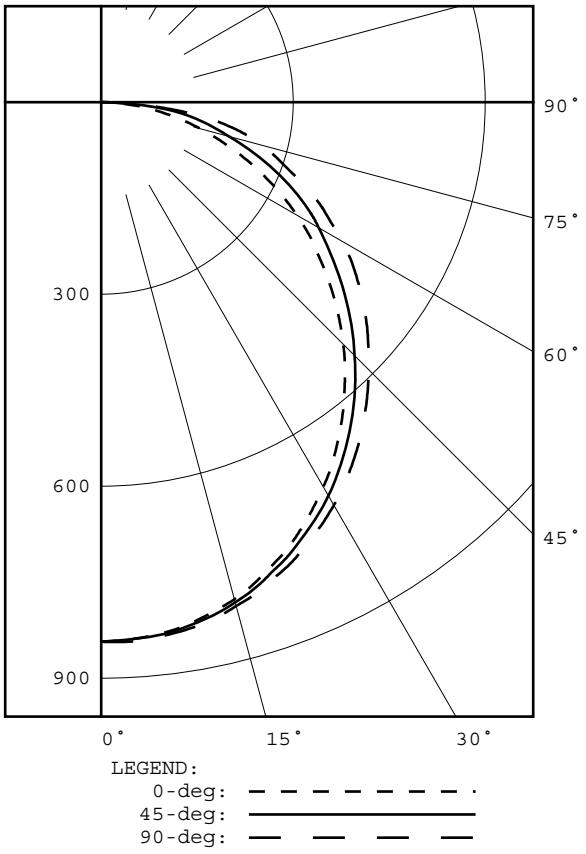
ZONE	LUMENS	%FIXT
0- 30	653	25.8
0- 40	1069	42.2
0- 60	1905	75.1
0- 90	2537	100.0
90-180	0	0.0
0-180	2537	100.0

TOTAL INPUT WATTS = 19.4
EFFICACY = 130.8 Lm/W
CIE TYPE - DIRECT

PLANE	: 0-DEG	90-DEG
SPACING CRITERIA	: 1.2	1.3
PLANE	: 0-DEG	90-DEG
LUMINOUS LENGTH	:21.510	20.140

LUMINANCE DATA IN CANDELA/SQ METER

ANGLE IN DEG	AVERAGE 0-DEG	AVERAGE 45-DEG	AVERAGE 90-DEG
45	2706.	2833.	2989.
55	2575.	2787.	3055.
65	2437.	2844.	3191.
75	2225.	2861.	3621.
85	1888.	3365.	3775.



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

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CATALOG NUMBER: RTLED2X2-19W/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 = 19.365 W AT 277.0 VAC.
LED DRIVER: RDF25U7-39
TEST PROCEDURE: IESNA LM-79-08
LM-80 DATA AVAILABLE FROM MANUFACTURER FOR SOLID STATE SOURCE
AMBIENT: 24.1
ACCREDITED LABORATORY CODE 201058-0

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PLANE	: 0-DEG	90-DEG
BEAM ANGLE (50%)	: 108.5 X	122.0 DEGREES
FIELD ANGLE (10%)	: 163.1 X	170.6 DEGREES

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CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0
0.0	843	843	843	843	843
2.5	841	839	841	843	844
5.0	838	837	839	841	842
7.5	833	833	835	837	838
10.0	825	825	828	832	833
12.5	815	816	820	825	826
15.0	804	805	809	814	815
17.5	790	792	797	802	805
20.0	773	775	781	789	791
22.5	757	759	766	775	778
25.0	737	739	748	758	761
27.5	716	719	730	741	745
30.0	694	698	710	723	727
32.5	671	676	688	702	708
35.0	645	650	664	680	686
37.5	619	625	640	657	664
40.0	591	597	614	633	640
42.5	564	570	588	608	616
45.0	535	541	560	582	591
47.5	505	512	533	556	566
50.0	475	481	504	530	542
52.5	444	451	476	504	516
55.0	413	420	447	477	490
57.5	385	392	419	450	464
60.0	353	364	393	422	434
62.5	321	333	366	394	404
65.0	288	301	336	364	377
67.5	256	270	305	332	345
70.0	223	240	272	299	314
72.5	191	208	240	270	287
75.0	161	178	207	244	262
77.5	131	147	179	217	230
80.0	102	118	152	182	193
82.5	74	89	121	142	148
85.0	46	61	82	92	92
87.5	20	29	34	33	29
90.0	1	1	0	0	0

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ZONAL LUMEN SUMMARY

0- 5	20.
5- 10	60.
10- 15	97.
15- 20	131.
20- 25	161.
25- 30	185.
30- 35	203.
35- 40	214.
40- 45	218.
45- 50	216.
50- 55	208.
55- 60	195.
60- 65	177.
65- 70	153.
70- 75	125.
75- 80	97.
80- 85	62.
85- 90	19.

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5-DEGREE ZONAL LUMEN SUMMARY

0- 5	20
5- 10	60
10- 15	97
15- 20	131
20- 25	161
25- 30	185
30- 35	203
35- 40	214
40- 45	218
45- 50	216
50- 55	208
55- 60	195
60- 65	177
65- 70	153
70- 75	125
75- 80	97
80- 85	62
85- 90	19
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	80
0- 20	308
0- 30	653
0- 40	1069
0- 50	1503
0- 60	1905
0- 70	2235
0- 80	2456
0- 90	2537
0-100	2537
0-110	2537
0-120	2537
0-130	2537
0-140	2537
0-150	2537
0-160	2537
0-170	2537
0-180	2537

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CATALOG NUMBER: RTLED2X2-19W/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	100	96	92	96	93	89	92	89	87	88	86	84	82
2	98	89	82	75	95	87	80	75	83	78	73	80	75	71	77	73	69	67
3	89	78	69	62	86	76	68	62	73	66	61	70	64	59	68	63	58	56
4	81	69	59	52	79	67	59	52	65	57	51	62	56	51	60	54	50	48
5	74	61	52	45	72	60	51	45	58	50	44	56	49	44	54	48	43	41
6	69	55	46	39	67	54	45	39	52	44	39	50	44	38	49	43	38	36
7	64	50	41	34	62	49	40	34	47	40	34	46	39	34	45	38	34	32
8	59	45	37	31	58	45	36	31	43	36	30	42	35	30	41	35	30	28
9	55	42	33	28	54	41	33	28	40	33	27	39	32	27	38	32	27	25
10	52	38	30	25	51	38	30	25	37	30	25	36	29	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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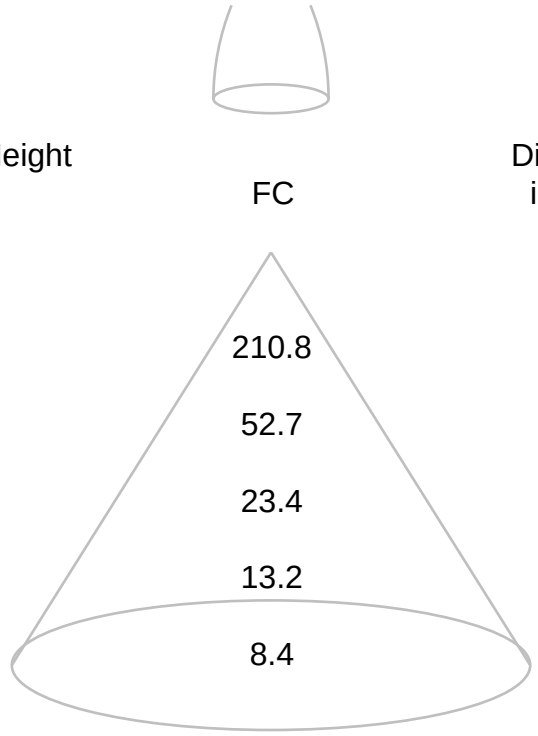
DATE SAMPLE TESTED: 04/20/17

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	210.8	2.5
4.0	52.7	5.0
6.0	23.4	7.5
8.0	13.2	10.0
10.0	8.4	12.5

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: RAB03221
DATE: 4/21/2017
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RTLED2X2-19W/D10

ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

LUMINAIRE: WHITE PAINTED SHEET METAL HOUSING, 2 WHITE CIRCUIT BOARDS EACH WITH 40 LEDS, MATTE WHITE POLYCARBONATE LENS IN THE CENTER, ROUGH SURFACE FACING OUT.FIXTURE WAS MOUNTED IN Lithonia Lighting Model #2GT8 2 U316 A12 MVOLT GEB10IS HOUSING.

LAMP: EIGHTY WHITE LIGHT EMITTING DIODES (LEDS), VERTICAL BASE-UP POSITION.

DRIVER: RDF25U7-39

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	04/10/18
RAB 2.0 meter Diameter Integrating Sphere, 4PI Geometry	04/10/18

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

RAB LIGHTING

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RESULTS:

PHOTOMETRIC	
Total Integrated Flux (lumens)	2537 *
SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.3450
Chromaticity Ordinate y	0.3542
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2104
Chromaticity Ordinate v'	0.4859
Correlated Color Temp CCT (K)	5012
ANSI C78.377-2008 Duv	0.001
Total Radiant Flux (milliWatts)	7977 *
ELECTRICAL	
Input Voltage (Volts AC)	277.0
Input Current (Amps AC)	0.078
Input Power (Watts)	19.4
Input Power Factor (%)	89.2
Input Current THD (%)	13.4
Input Voltage THD (%)	0.2
EFFICACY (Lumens/Watt)	130.8
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	120.0
Input Current (Amps AC)	0.158
Input Power (Watts)	18.7
Input Power Factor (%)	98.7
Input Current THD (%)	10.8
Input Voltage THD (%)	0.2
Off-State Power (Watts)	0.0

COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	85
R1 Light greyish red	84
R2 Dark greyish yellow	90
R3 Strong yellowish green	94
R4 Moderate yellowish green	85
R5 Light bluish green	85
R6 Light blue	86
R7 Light violet	87
R8 Light reddish purple	69
R9 Strong red	16
R10 Strong yellow	77
R11 Strong green	85
R12 Strong blue	67
R13 Light yellowish pink (skin)	85
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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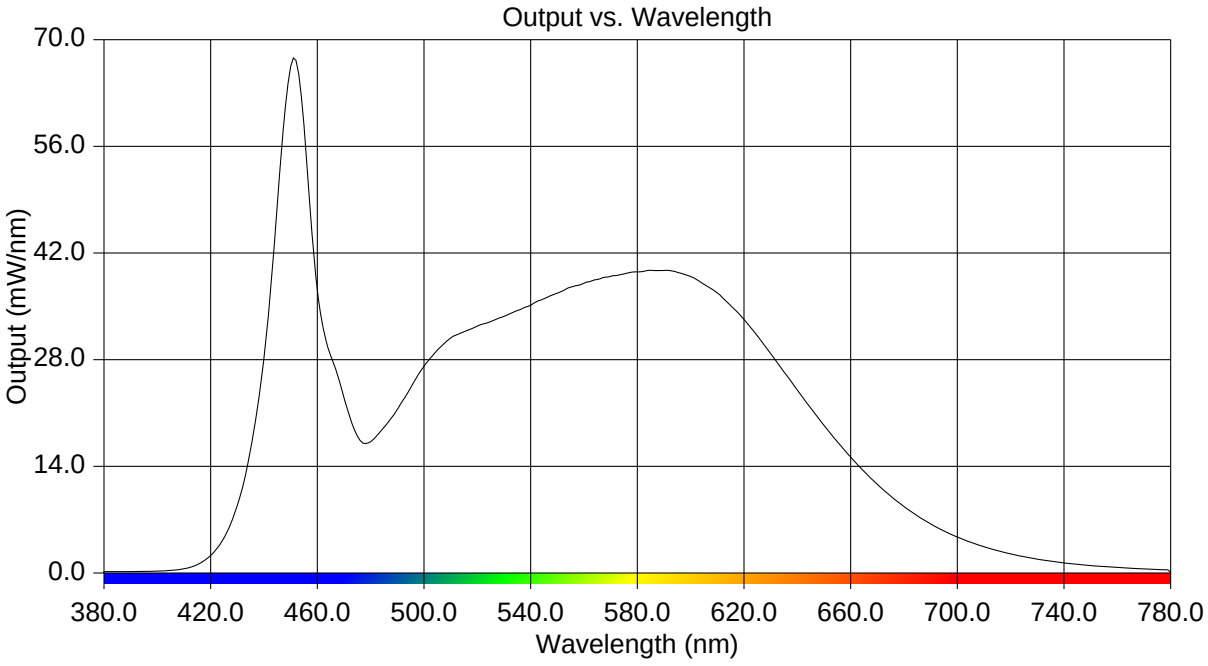
RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	0.167	515	31.663	650	19.400
385	0.174	520	32.398	655	17.229
390	0.187	525	33.019	660	15.201
395	0.207	530	33.682	665	13.325
400	0.246	535	34.451	670	11.625
405	0.329	540	35.146	675	10.100
410	0.550	545	36.002	680	8.720
415	1.101	550	36.726	685	7.502
420	2.285	555	37.519	690	6.445
425	4.587	560	38.040	695	5.517
430	8.890	565	38.518	700	4.710
435	16.170	570	38.941	705	4.034
440	28.350	575	39.255	710	3.438
445	48.302	580	39.530	715	2.925
450	66.472	585	39.728	720	2.496
455	58.748	590	39.700	725	2.137
460	37.141	595	39.462	730	1.825
465	28.517	600	38.913	735	1.554
470	22.995	605	37.869	740	1.326
475	17.984	610	36.761	745	1.135
480	17.231	615	35.104	750	0.977
485	19.101	620	33.277	755	0.839
490	21.463	625	31.184	760	0.716
495	24.314	630	28.792	765	0.616
500	27.166	635	26.387	770	0.532
505	29.267	640	23.991	775	0.460
510	30.863	645	21.655	780	0.069



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CIE Chromaticity Diagram