RAB LIGHTING

NVLAP LAB CODE: 201058-0

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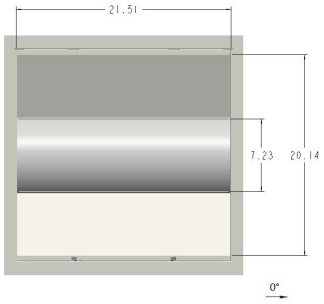
REPORT NUMBER: RAB03239 PAGE: 1 OF 8
ISSUE DATE: 04/25/17 DATE SAMPLE TESTED: 04/25/17
CATALOG NUMBER: RTLED2X2-29YW/D10
LUMINAIRE: WHITE PAINTED SHEET METAL HOUSING, 2 WHITE CIRCUIT BOARDS EACH WITH 60 LEDS, MATTE WHITE POLYCARBONATE LENS IN THE CENTER, ROUGH SURFACE FACING OUT.FIXTURE WAS MOUNTED IN Lithonia Lighting Model #2GT8 2 U316 A12 MVOLT GEB10IS HOUSING.
LAMP]ONE HUNDRED AND TWENTY 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	1187	1187	1187	1187	1187	
5	1181	1179	1182	1184	1185	112
15	1134	1134	1141	1147	1150	322
25	1044	1046	1058	1069	1074	488
35	919	923	941	960	967	590
45	765	774	798	825	836	617
55	594	604	639	676	694	574
65	413	429	475	512	529	467
75	235	255	298	347	373	317
85	69	88	120	133	139	117
90	1	1	0	0	0	

ZONAL LUMEN SUMMARY

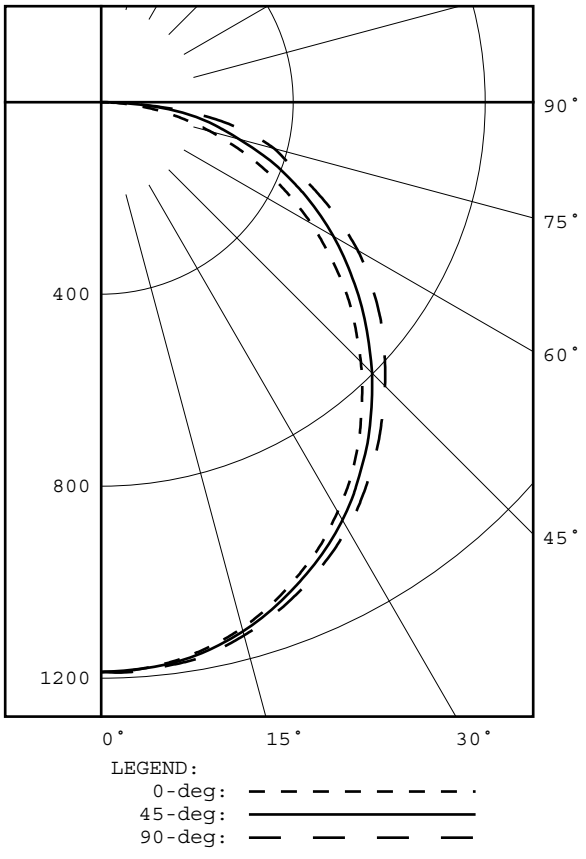
ZONE	LUMENS	%FIXT
0- 30	922	25.6
0- 40	1512	41.9
0- 60	2702	75.0
0- 90	3604	100.0
90-180	0	0.0
0-180	3604	100.0

TOTAL INPUT WATTS = 29.0
EFFICACY = 124.3 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	3869.	4036.	4229.
55	3704.	3985.	4328.
65	3495.	4020.	4477.
75	3247.	4118.	5155.
85	2832.	4924.	5704.



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

REPORT NUMBER: RAB03239 PAGE: 2 OF 8
ISSUE DATE: 04/25/17 DATE SAMPLE TESTED: 04/25/17
CATALOG NUMBER: RTLED2X2-29YW/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 = 29.01 W AT 277.0 VAC.
LED DRIVER: RDF25U7-32
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%)	:	109.9 X 122.6 DEGREES
FIELD ANGLE (10%)	:	163.7 X 171.1 DEGREES

REPORT NUMBER: RAB03239 PAGE: 4 OF 8
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CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0
0.0	1187	1187	1187	1187	1187
2.5	1186	1183	1185	1189	1189
5.0	1181	1179	1182	1184	1185
7.5	1174	1174	1177	1180	1181
10.0	1163	1163	1168	1173	1176
12.5	1150	1150	1156	1162	1164
15.0	1134	1134	1141	1147	1150
17.5	1115	1116	1124	1131	1134
20.0	1093	1094	1103	1112	1116
22.5	1069	1071	1081	1091	1096
25.0	1044	1046	1058	1069	1074
27.5	1016	1019	1033	1046	1051
30.0	985	990	1005	1019	1025
32.5	954	959	975	991	998
35.0	919	923	941	960	967
37.5	883	889	908	929	936
40.0	843	851	872	893	903
42.5	805	813	835	861	869
45.0	765	774	798	825	836
47.5	723	733	758	788	802
50.0	683	691	719	751	767
52.5	640	648	680	714	732
55.0	594	604	639	676	694
57.5	549	561	599	638	656
60.0	505	518	559	599	617
62.5	459	473	517	556	573
65.0	413	429	475	512	529
67.5	371	389	431	466	484
70.0	325	344	390	421	441
72.5	279	299	343	384	404
75.0	235	255	298	347	373
77.5	192	211	258	308	328
80.0	150	168	220	259	277
82.5	108	126	174	202	215
85.0	69	88	120	133	139
87.5	31	42	53	49	49
90.0	1	1	0	0	0

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CATALOG NUMBER: RTLED2X2-29YW/D10

ZONAL LUMEN SUMMARY

0- 5	28.
5- 10	84.
10- 15	137.
15- 20	185.
20- 25	227.
25- 30	261.
30- 35	287.
35- 40	303.
40- 45	309.
45- 50	307.
50- 55	296.
55- 60	277.
60- 65	251.
65- 70	217.
70- 75	179.
75- 80	138.
80- 85	89.
85- 90	28.

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CATALOG NUMBER: RTLED2X2-29YW/D10

5-DEGREE ZONAL LUMEN SUMMARY

0- 5	28
5- 10	84
10- 15	137
15- 20	185
20- 25	227
25- 30	261
30- 35	287
35- 40	303
40- 45	309
45- 50	307
50- 55	296
55- 60	277
60- 65	251
65- 70	217
70- 75	179
75- 80	138
80- 85	89
85- 90	28
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	112
0- 20	434
0- 30	922
0- 40	1512
0- 50	2128
0- 60	2702
0- 70	3169
0- 80	3486
0- 90	3604
0-100	3604
0-110	3604
0-120	3604
0-130	3604
0-140	3604
0-150	3604
0-160	3604
0-170	3604
0-180	3604

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CATALOG NUMBER: RTLED2X2-29YW/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	92	89	92	89	86	88	86	84	82
2	98	89	81	75	95	87	80	74	83	78	73	80	75	71	77	73	69	67
3	89	78	69	62	86	76	68	62	73	66	60	70	64	59	67	63	58	56
4	81	68	59	52	79	67	59	52	65	57	51	62	56	50	60	54	50	47
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	38	50	43	38	49	43	38	36
7	64	50	41	34	62	49	40	34	47	40	34	46	39	34	44	38	33	31
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	27	40	32	27	39	32	27	38	31	27	25
10	52	38	30	25	50	38	30	25	37	30	25	36	29	25	35	29	24	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.

REPORT NUMBER: RAB03239
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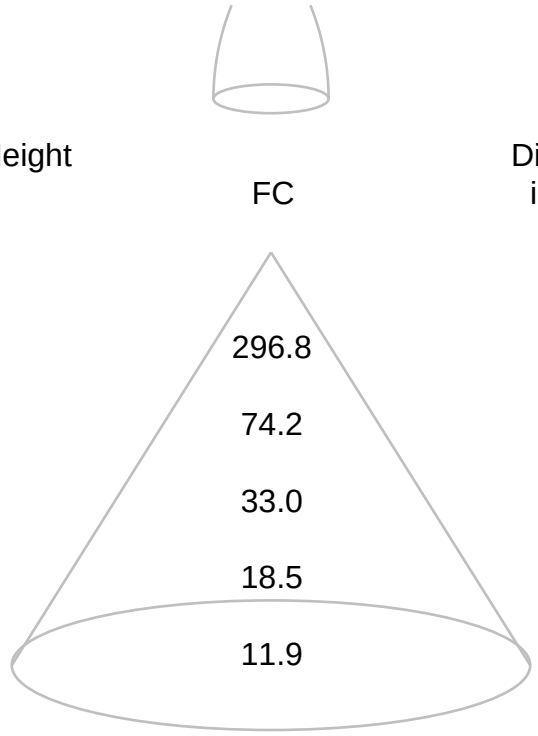
CATALOG NUMBER: RTLED2X2-29YW/D10

DATE SAMPLE TESTED: 04/25/17

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	296.8	2.5
4.0	74.2	5.0
6.0	33.0	7.6
8.0	18.5	10.1
10.0	11.9	12.6

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: RAB03240
DATE: 4/24/2017
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RTLED2X2-29YW/D10

ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

LUMINAIRE: WHITE PAINTED SHEET METAL HOUSING, 2 WHITE CIRCUIT BOARDS EACH WITH 60 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: RDF25U7-32

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

REPORT NUMBER: RAB03240
DATE: 4/24/2017
PREPARED FOR: RAB LIGHTING INC.
CATALOG NUMBER: RTLED2X2-29YW/D10

RESULTS:

PHOTOMETRIC	
Total Integrated Flux (lumens)	3604 *
SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.4310
Chromaticity Ordinate y	0.3989
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2489
Chromaticity Ordinate v'	0.5184
Correlated Color Temp CCT (K)	3060
ANSI C78.377-2008 Duv	-0.001
Total Radiant Flux (milliWatts)	11019 *
ELECTRICAL	
Input Voltage (Volts AC)	277.0
Input Current (Amps AC)	0.114
Input Power (Watts)	29.0
Input Power Factor (%)	92.0
Input Current THD (%)	12.4
Input Voltage THD (%)	0.2
EFFICACY (Lumens/Watt)	124.3
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	120.0
Input Current (Amps AC)	0.240
Input Power (Watts)	28.4
Input Power Factor (%)	98.8
Input Current THD (%)	14.3
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	92
R3 Strong yellowish green	96
R4 Moderate yellowish green	83
R5 Light bluish green	84
R6 Light blue	91
R7 Light violet	83
R8 Light reddish purple	60
R9 Strong red	11
R10 Strong yellow	82
R11 Strong green	83
R12 Strong blue	77
R13 Light yellowish pink (skin)	85
R14 Moderate olive green (leaf)	99

*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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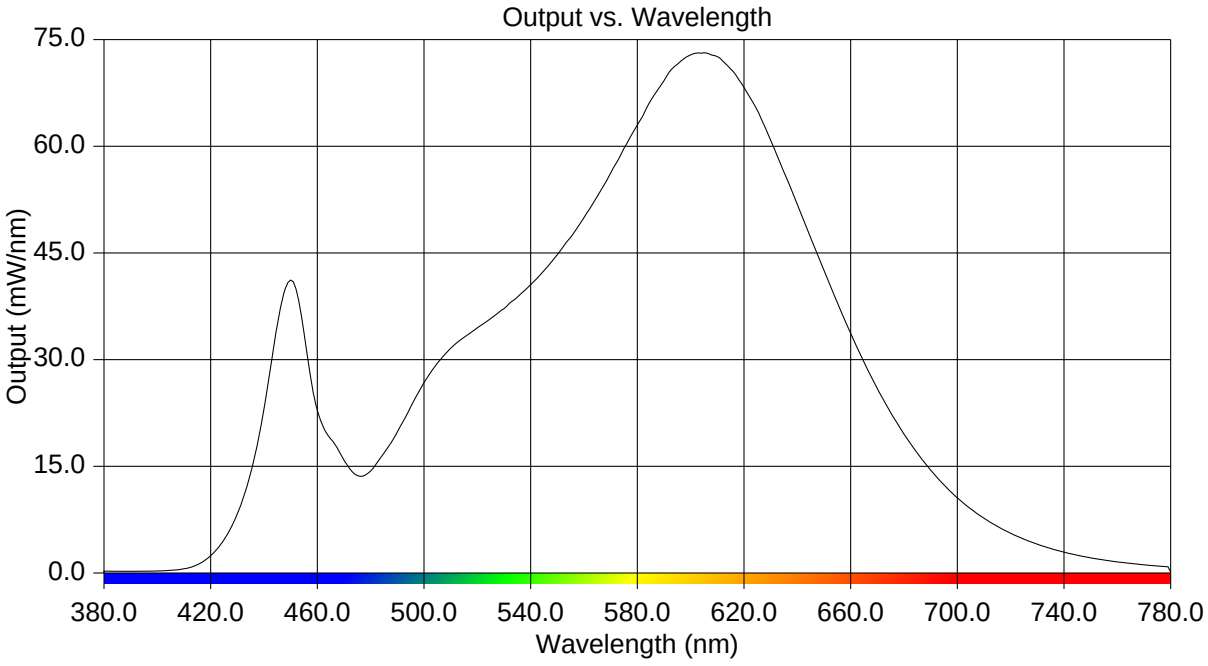
RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	0.240	515	33.124	650	42.549
385	0.254	520	34.473	655	38.028
390	0.240	525	35.772	660	33.683
395	0.246	530	37.173	665	29.622
400	0.280	535	38.785	670	25.935
405	0.361	540	40.541	675	22.585
410	0.583	545	42.487	680	19.529
415	1.165	550	44.744	685	16.880
420	2.407	555	47.198	690	14.437
425	4.638	560	49.997	695	12.387
430	8.290	565	52.980	700	10.592
435	14.107	570	56.245	705	9.020
440	23.184	575	59.727	710	7.684
445	34.816	580	63.032	715	6.550
450	41.191	585	66.421	720	5.582
455	33.785	590	69.248	725	4.742
460	22.876	595	71.533	730	4.036
465	18.857	600	72.852	735	3.443
470	15.879	605	73.158	740	2.924
475	13.709	610	72.621	745	2.485
480	14.338	615	70.870	750	2.134
485	16.861	620	68.276	755	1.821
490	19.836	625	65.101	760	1.560
495	23.350	630	60.876	765	1.329
500	26.775	635	56.351	770	1.152
505	29.520	640	51.815	775	0.983
510	31.567	645	47.135	780	0.148



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CIE Chromaticity Diagram