

REPORT NUMBER:RAB04608

PAGE: 1 OF 6

ISSUE DATE:09/06/18

DATE SAMPLE TESTED: 09/06/18

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

CATALOG NUMBER: CDL4[WD, S, PC, PS]-20W80D930-ODLENS

LUMINAIRE: EXTRUDED BLACK PAINTED METAL HOUSING, CAST FINNED METAL HEAT SINK, 1 WHITE CIRCUIT BOARD WITH 1 LED, MOLDED PLASTIC UPPER REFLECTOR, HOLOGRAPHIC PLASTIC LENS OVER UPPER APERTURE OF LOWER REFLECTOR, ALUMINUM TRIM DOOR WITH GLASS LENS.

LAMP: ONE WHITE LIGHT EMITTING DIODES (LEDS).

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.

ABSOLUTE: NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED.

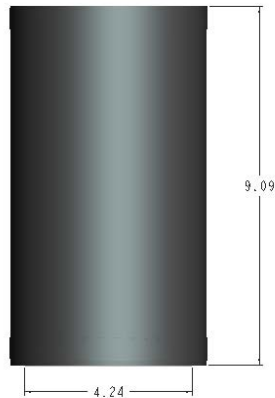
WATT: TOTAL INPUT WATTS = 20 W AT 277.0 VAC.

LED DRIVER: LED DRIVER: RDD-30W-042SE-A0500

PROCEDURE: TEST PROCEDURE: IESNA LM-79-08

NOTE: LM-80 DATA AVAILABLE FROM MANUFACTURER FOR SOLID STATE SOURCE
AMBIENT: 24.3

NVLAP LAB CODE: ACCREDITED LABORATORY CODE 201058-0



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.

Checked X.CAO

Approved D.WANG-MUNSON

REPORT NUMBER: RAB04608

PAGE: 2 OF 6

ISSUE DATE: 09/06/18

DATE SAMPLE TESTED: 09/06/18

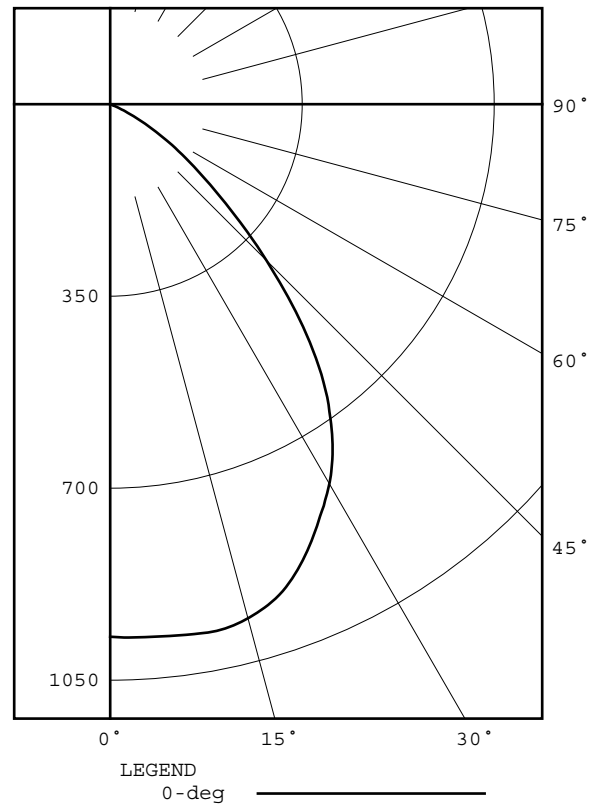
PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

CATALOG NUMBER: CDL4 [WD, S, PC, PS] -20W80D930-ODLENS

DEG	CANDELA	LUMENS
0	971	
5	974	93
15	970	273
25	873	401
35	700	433
45	401	311
55	160	145
65	27	32
75	3	3
85	1	1
90	0	
95	0	0
105	0	0
115	0	0
125	0	0
135	0	0
145	0	0
155	0	0
165	0	0
175	0	0
180	0	

ZONAL ZONE	LUMEN LUMENS	SUMMARY %FIXT
0- 30	768	45.3
0- 40	1201	70.9
0- 60	1658	97.9
0- 90	1693	100.0
90-120	0	0.0
90-130	0	0.0
90-150	0	0.0
90-180	0	0.0
0-180	1693	100.0

EFFICACY = 84.7 lm/W
CIE TYPE - DIRECT
SPACING CRITERION: 1.21



REPORT NUMBER: RAB04608

PAGE: 3 OF 6

ISSUE DATE: 09/06/18

DATE SAMPLE TESTED: 09/06/18

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

CATALOG NUMBER: CDL4 [WD, S, PC, PS] -20W80D930-ODLENS

CANDELA DISTRIBUTION

0.0	971	60.0	82	120.0	0	180.0	0
1.0	972	61.0	69	121.0	0		
2.0	973	62.0	57	122.0	0		
3.0	973	63.0	46	123.0	0		
4.0	974	64.0	35	124.0	0		
5.0	974	65.0	27	125.0	0		
6.0	975	66.0	19	126.0	0		
7.0	976	67.0	13	127.0	0		
8.0	977	68.0	9	128.0	0		
9.0	978	69.0	6	129.0	0		
10.0	979	70.0	5	130.0	0		
11.0	980	71.0	5	131.0	0		
12.0	979	72.0	4	132.0	0		
13.0	977	73.0	3	133.0	0		
14.0	974	74.0	3	134.0	0		
15.0	970	75.0	3	135.0	0		
16.0	966	76.0	2	136.0	0		
17.0	960	77.0	2	137.0	0		
18.0	954	78.0	2	138.0	0		
19.0	946	79.0	2	139.0	0		
20.0	937	80.0	1	140.0	0		
21.0	926	81.0	1	141.0	0		
22.0	914	82.0	1	142.0	0		
23.0	901	83.0	1	143.0	0		
24.0	887	84.0	1	144.0	0		
25.0	873	85.0	1	145.0	0		
26.0	858	86.0	1	146.0	0		
27.0	843	87.0	0	147.0	0		
28.0	829	88.0	0	148.0	0		
29.0	814	89.0	0	149.0	0		
30.0	799	90.0	0	150.0	0		
31.0	782	91.0	0	151.0	0		
32.0	764	92.0	0	152.0	0		
33.0	744	93.0	0	153.0	0		
34.0	723	94.0	0	154.0	0		
35.0	700	95.0	0	155.0	0		
36.0	677	96.0	0	156.0	0		
37.0	652	97.0	0	157.0	0		
38.0	625	98.0	0	158.0	0		
39.0	596	99.0	0	159.0	0		
40.0	566	100.0	0	160.0	0		
41.0	534	101.0	0	161.0	0		
42.0	501	102.0	0	162.0	0		
43.0	468	103.0	0	163.0	0		
44.0	435	104.0	0	164.0	0		
45.0	401	105.0	0	165.0	0		
46.0	373	106.0	0	166.0	0		
47.0	342	107.0	0	167.0	0		
48.0	313	108.0	0	168.0	0		
49.0	286	109.0	0	169.0	0		
50.0	261	110.0	0	170.0	0		
51.0	238	111.0	0	171.0	0		
52.0	216	112.0	0	172.0	0		
53.0	196	113.0	0	173.0	0		
54.0	178	114.0	0	174.0	0		
55.0	160	115.0	0	175.0	0		
56.0	143	116.0	0	176.0	0		
57.0	127	117.0	0	177.0	0		
58.0	111	118.0	0	178.0	0		
59.0	97	119.0	0	179.0	0		

REPORT NUMBER: RAB04608

PAGE: 4 OF 6

ISSUE DATE: 09/06/18

DATE SAMPLE TESTED: 09/06/18

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

CATALOG NUMBER: CDL4 [WD, S, PC, PS] -20W80D930-ODLENS

5-DEGREE
ZONAL LUMEN SUMMARY

0- 5	23
5- 10	70
10- 15	116
15- 20	157
20- 25	190
25- 30	211
30- 35	221
35- 40	212
40- 45	179
45- 50	133
50- 55	90
55- 60	55
60- 65	25
65- 70	6
70- 75	2
75- 80	1
80- 85	1
85- 90	0
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	93
0- 20	366
0- 30	768
0- 40	1201
0- 50	1513
0- 60	1658
0- 70	1690
0- 80	1693
0- 90	1693
0-100	1693
0-110	1693
0-120	1693
0-130	1693
0-140	1693
0-150	1693
0-160	1693
0-170	1693
0-180	1693

REPORT NUMBER: RAB04608

PAGE: 5 OF 6

ISSUE DATE: 09/06/18

DATE SAMPLE TESTED: 09/06/18

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

CATALOG NUMBER: CDL4 [WD, S, PC, PS] -20W80D930-ODLENS

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	111	106	106	106	102	102	102	100
1	112	109	106	103	110	107	104	102	103	100	98	99	99	97	96	95	94	93	91
2	105	99	94	90	103	97	93	89	94	90	87	91	88	85	88	86	83	81	81
3	98	90	84	79	96	89	83	78	86	81	77	83	79	76	81	78	75	73	73
4	91	82	75	70	89	81	75	70	79	73	69	76	72	68	75	70	67	65	65
5	85	75	68	63	84	74	67	62	72	66	62	70	65	61	69	64	61	59	59
6	80	69	62	56	78	68	61	56	66	60	56	65	59	55	63	59	55	53	53
7	75	63	56	51	73	63	56	51	61	55	50	60	54	50	59	54	50	48	48
8	70	59	51	46	69	58	51	46	57	50	46	56	50	46	54	49	46	44	44
9	66	54	47	42	65	54	47	42	53	46	42	52	46	42	51	46	42	40	40
10	62	50	44	39	61	50	43	39	49	43	39	48	43	39	47	42	38	37	37

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 TEST SAMPLE.

REPORT NUMBER: RAB04608

PAGE: 6 OF 6

ISSUE DATE: 09/06/18

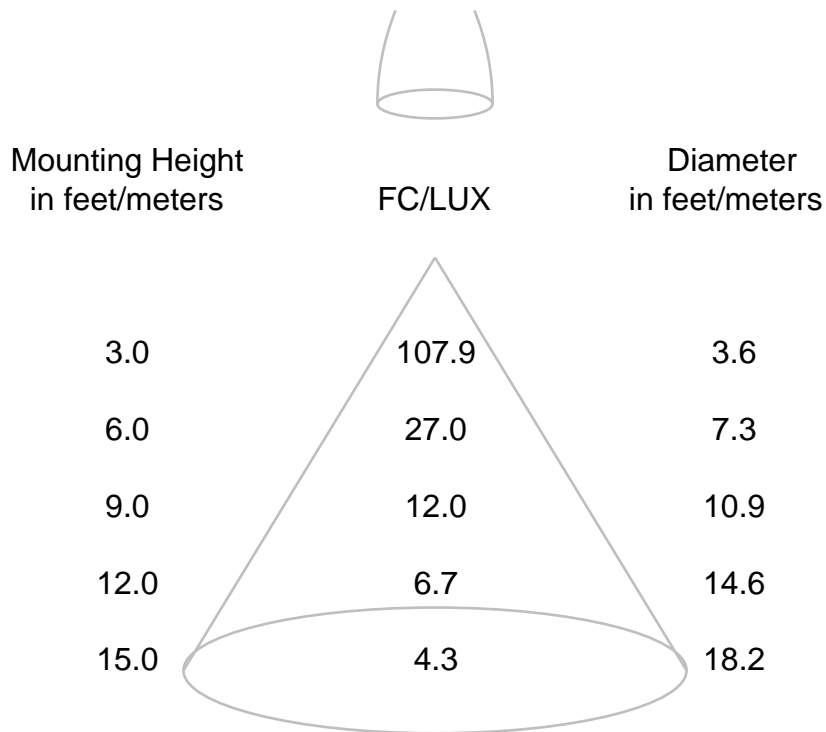
DATE SAMPLE TESTED: 09/06/18

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

CATALOG NUMBER: CDL4 [WD, S, PC, PS] -20W80D930-ODLENS

CONE OF LIGHT DIAGRAM

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



If distances are feet, results are footcandles.
If distances are meters, results are lux.

REPORT NUMBER: RAB04617
DATE: 9/7/2018
PREPARED FOR: RAB LIGHTING INC. RC LIGHTING
CATALOG NUMBER: CDL4 [WD, WU, S, PC, PS] -20W80D930-ODLENS

ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

LUMINAIRE: EXTRUDED BLACK PAINTED METAL HOUSING, CAST FINNED METAL HEAT SINK, 1 WHITE CIRCUIT BOARD WITH 1 LED, MOLDED PLASTIC UPPER REFLECTOR, HOLOGRAPHIC PLASTIC LENS OVER UPPER APERTURE OF LOWER REFLECTOR, ALUMINUM TRIM DOOR WITH GLASS LENS.

LAMP: ONE WHITE LIGHT EMITTING DIODES (LEDS).

DRIVER: RDD-30W-042SE-A0500

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: GWINSTEK PROGRAMMABLE AC POWER SOURCE APS-7100 N/A
CHROMA PROGRAMMABLE DIGITAL POWER METER MODEL 66202 3/08/19
OCEAN OPTICS QE65PRO Spectroradiometer 08/22/19
RAB 2.0 meter Diameter Integrating Sphere, 4PI Geometry 08/22/19
Calibration Due:

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

REPORT NUMBER: RAB04617
 DATE: 9/7/2018
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING
 CATALOG NUMBER: CDL4 [WD, WU, S, PC, PS] -20W80D930-ODLENS

RESULTS:

PHOTOMETRIC	
Total Integrated Flux (lumens)	1693 *
SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.4333
Chromaticity Ordinate y	0.4066
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2472
Chromaticity Ordinate v'	0.5218
Correlated Color Temp CCT (K)	3082
ANSI C78.377-2008 Duv	0.002
Total Radiant Flux (milliWatts)	5717 *
ELECTRICAL	
Input Voltage (Volts AC)	277.0
Input Current (Amps AC)	0.081
Input Power (Watts)	20.0
Input Power Factor (%)	88.9
Input Current THD (%)	20.7
Input Voltage THD (%)	0.2
EFFICACY (Lumens/Watt)	
84.7	
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	120.0
Input Current (Amps AC)	0.164
Input Power (Watts)	19.3
Input Power Factor (%)	98.6
Input Current THD (%)	12.0
Input Voltage THD (%)	0.2
Off-State Power (Watts)	
0.0	

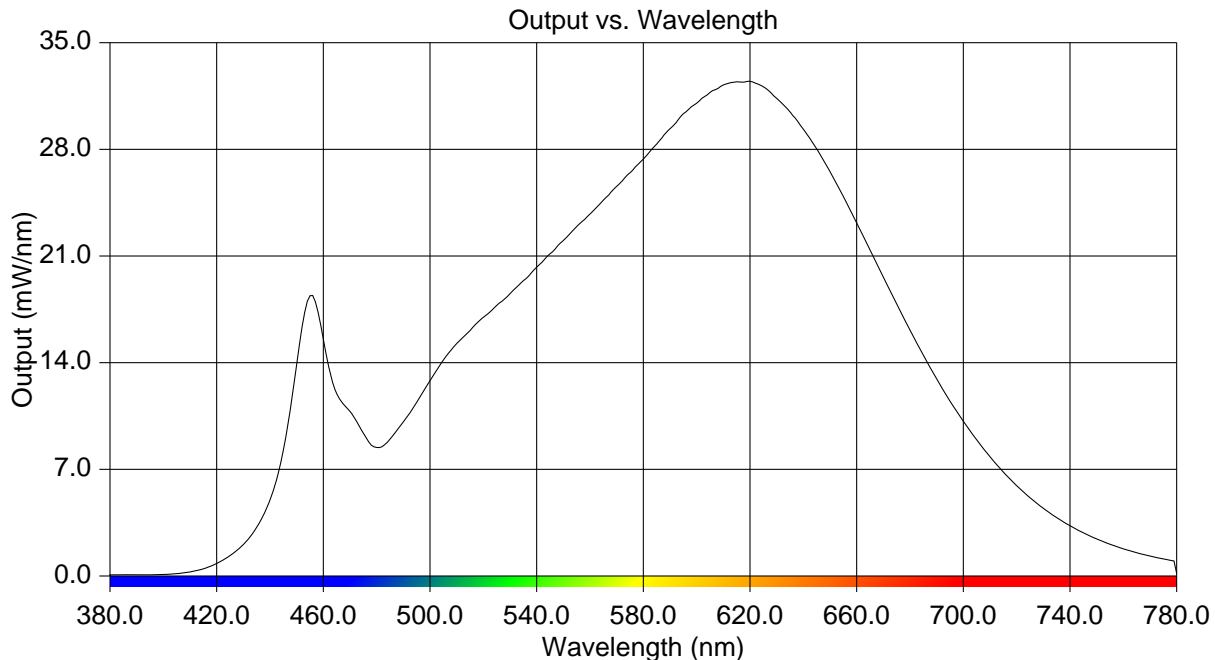
COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	91
R1 Light greyish red	90
R2 Dark greyish yellow	95
R3 Strong yellowish green	99
R4 Moderate yellowish green	90
R5 Light bluish green	90
R6 Light blue	94
R7 Light violet	91
R8 Light reddish purple	78
R9 Strong red	51
R10 Strong yellow	88
R11 Strong green	90
R12 Strong blue	76
R13 Light yellowish pink (skin)	91
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.

REPORT NUMBER: RAB04617
 DATE: 9/7/2018
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING
 CATALOG NUMBER: CDL4 [WD, WU, S, PC, PS] -20W80D930-ODLENS

RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	0.072	515	16.102	650	26.544
385	0.070	520	16.975	655	24.907
390	0.073	525	17.754	660	23.161
395	0.082	530	18.500	665	21.389
400	0.104	535	19.378	670	19.645
405	0.155	540	20.265	675	17.855
410	0.262	545	21.145	680	16.128
415	0.467	550	22.017	685	14.487
420	0.823	555	22.932	690	12.910
425	1.340	560	23.770	695	11.473
430	2.072	565	24.664	700	10.150
435	3.196	570	25.577	705	8.926
440	4.985	575	26.461	710	7.818
445	8.257	580	27.350	715	6.828
450	13.879	585	28.344	720	5.942
455	18.393	590	29.364	725	5.141
460	15.544	595	30.334	730	4.439
465	11.962	600	31.026	735	3.825
470	10.804	605	31.734	740	3.288
475	9.384	610	32.224	745	2.826
480	8.434	615	32.433	750	2.443
485	8.980	620	32.465	755	2.085
490	10.110	625	32.123	760	1.789
495	11.393	630	31.347	765	1.525
500	12.815	635	30.461	770	1.308
505	14.176	640	29.308	775	1.122
510	15.251	645	28.021	780	0.166



REPORT NUMBER: RAB04617
DATE: 9/7/2018
PREPARED FOR: RAB LIGHTING INC. RC LIGHTING
CATALOG NUMBER: CDL4 [WD, WU, S, PC, PS] -20W80D930-ODLENS

Page 4 of 4

CIE Chromaticity Diagram

