

**Report Number:** PL18137-001A  
**Model:** OSQP-C-3L-50K7-3R-UL (Light Engine)  
**Issue Date:** 02/05/2024

## **Cree Racine Engineering Services Testing Laboratory (RESTL) Photometric Testing and Evaluation Report**

**Prepared For:**

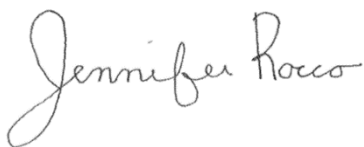
Tammy Lehrmann

Cree Lighting

9201 Washington Avenue

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**Prepared By:**



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**Approved By:**



Meranda Hubbard, Photometric Test Technician

## Product Information

Manufacturer	Cree Lighting
Model Number (SKU)	OSQP-C-3L-50K7-3R-UL (Light Engine)
Serial Number	18137
LED Type	SSC STW7C12C-E0

## Product Description

OSQP-C Pathway Luminaire (Light Engine), 3L Lumen Package, 5000K 70CRI, Type 3M Rotatable Optics

## Driver Information (Where Applicable)

Signify XI030C080V054BSJ1

Length	Width	Height
9.5"	9.5"	6.9"

## Sample

The following sample was submitted for evaluation



Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	2860.0	2846.0	lm
Efficacy	145.49	144.39	lm/W
Correlated Color Temperature (CCT)	5220	K	
Color Rendering Index (CRI)	73		
R <sub>9</sub>	-32		
Duv	0.0013		
TM-30 R <sub>f</sub> *	74		
TM-30 R <sub>g</sub> *	92		
TM-30 R <sub>cs,h1</sub> *	-18.5%		
S/P Ratio*	1.85		

Electrical Measurements	Sphere		Goniophotometer		
	120V	277V	120V	277V	
Input Wattage	19.66	19.78	19.71	19.94	W
Input Current	0.169	0.075	0.169	0.075	A
Input Voltage	120.09	277.38	120.16	277.38	V
Power Factor	0.968	0.956	0.972	0.958	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.12	0.14	0.08	0.16	%
Total Harmonic Distortion (Amperage)	11.77	10.81	12.45	9.97	%

**Note:** All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Max Candela	1723.09	Cd
Angle of Max Candela (Horizontal)	65	°
Angle of Max Candela (Vertical)	62	°

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	47	30	min
Total Operating Time (Stabilization + Test)	57	50	min
Ambient Temperature	24.81	25.1	°C

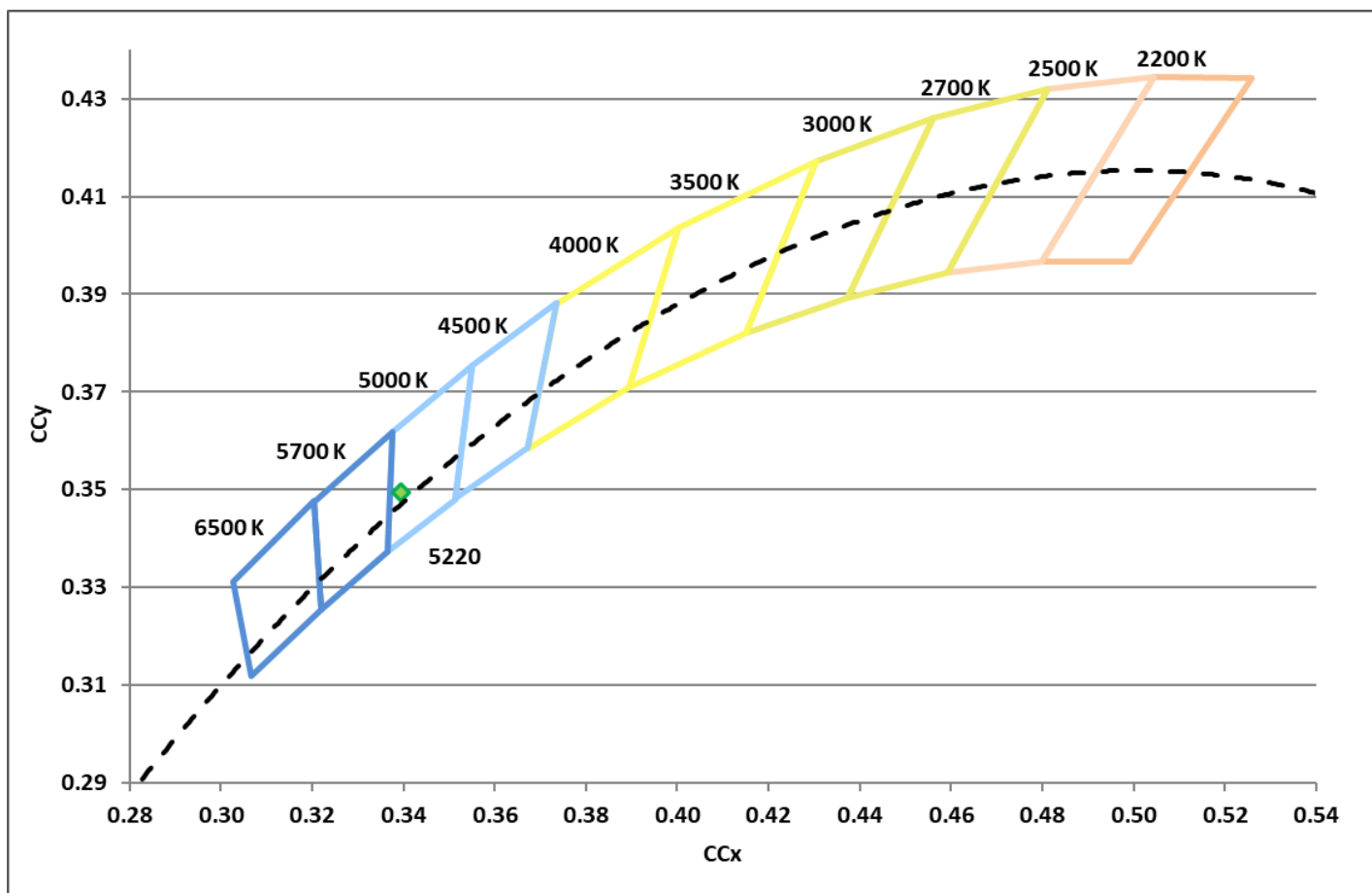
## Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3394	0.3496	0.2083	0.3219	0.2083	0.4828	0.0013

## Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
73	71	80	85	72	71	70	82	55	-32	50	68	41	72	91

## Chromaticity Diagram



NOTE: The Chromaticity Diagram shown above references table A1 specification for 7-step quadrangles referenced in ANSI C78.377-2017.

**Spectral Distribution**

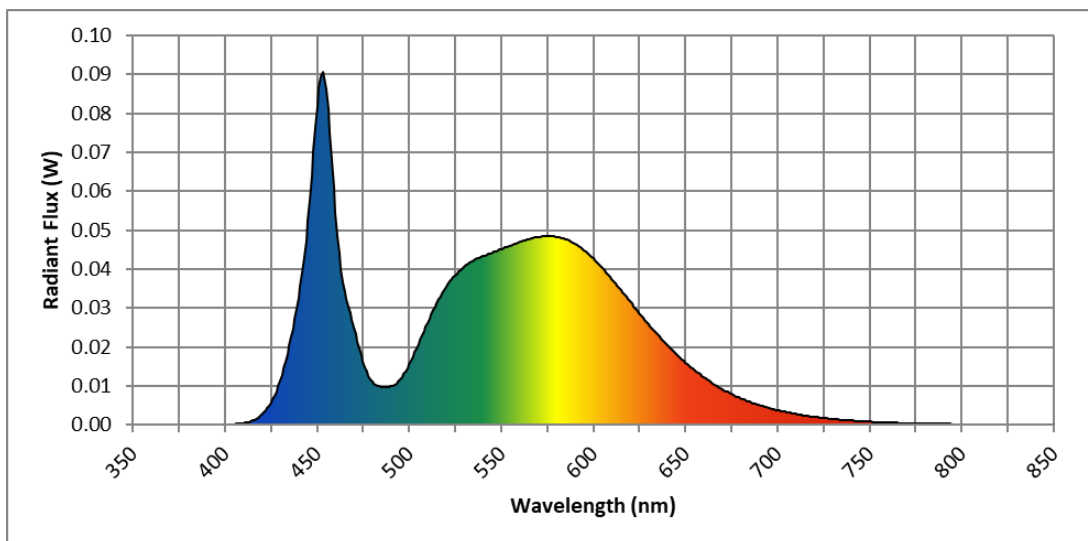
$\lambda$ (nm)	W/nm
360	0.000007
370	0.000024
380	0.000006
390	0.000026
400	0.000082
410	0.000417
420	0.002582
430	0.011321
440	0.032656
450	0.081961
460	0.054436
470	0.025067
480	0.011079
490	0.009865
500	0.015559
510	0.026210
520	0.035383

$\lambda$ (nm)	W/nm
530	0.040643
540	0.043270
550	0.045173
560	0.046922
570	0.048291
580	0.048301
590	0.046450
600	0.042652
610	0.037489
620	0.031624
630	0.025883
640	0.020531
650	0.015987
660	0.012252
670	0.009205
680	0.006825
690	0.005068

$\lambda$ (nm)	W/nm
700	0.003755
710	0.002757
720	0.002032
730	0.001480
740	0.001064
750	0.000790
760	0.000579
770	0.000418
780	0.000302
790	0.000225
800	0.000149
810	0.000109
820	0.000072
830	0.000038

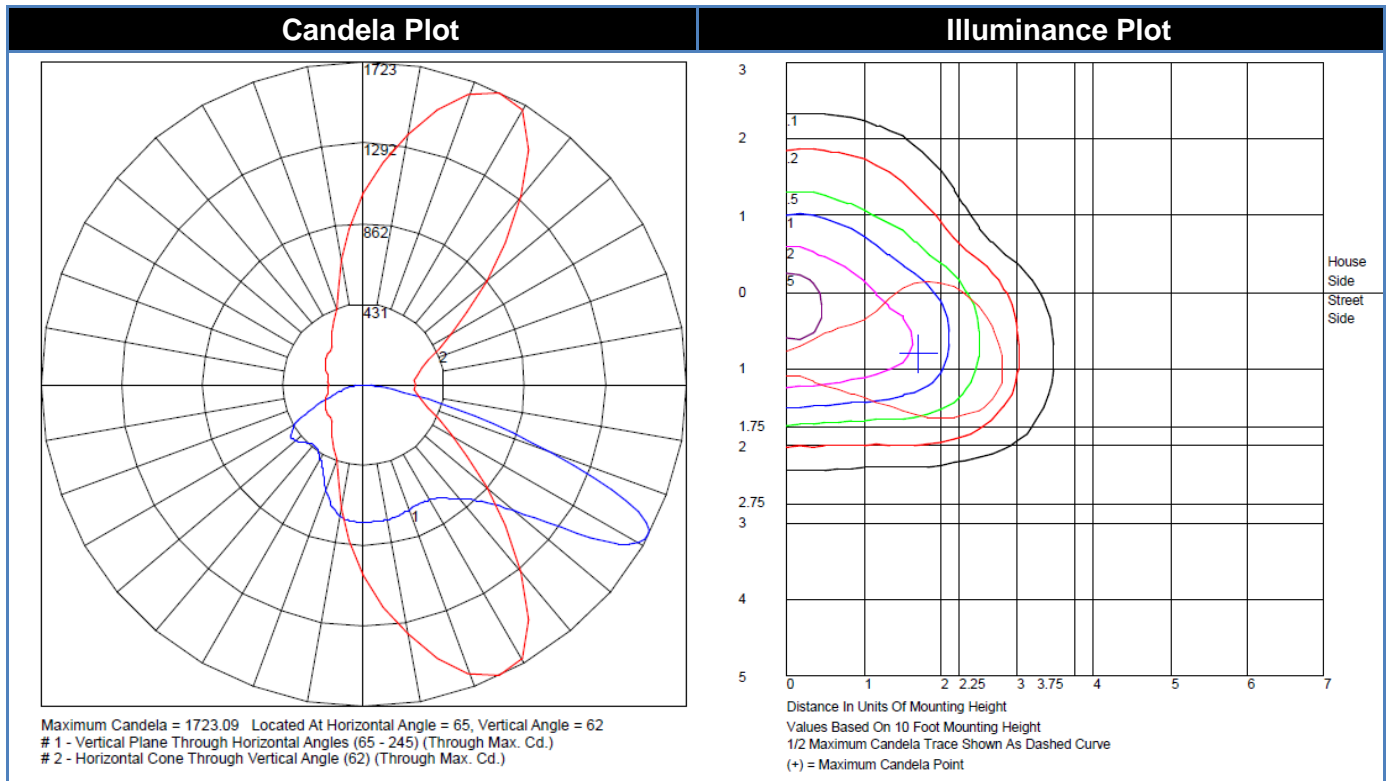
<b>Dominant Wavelength</b>	567	nm
<b>Peak Wavelength</b>	453	nm

**Spectral Power Distribution (W/nm)**



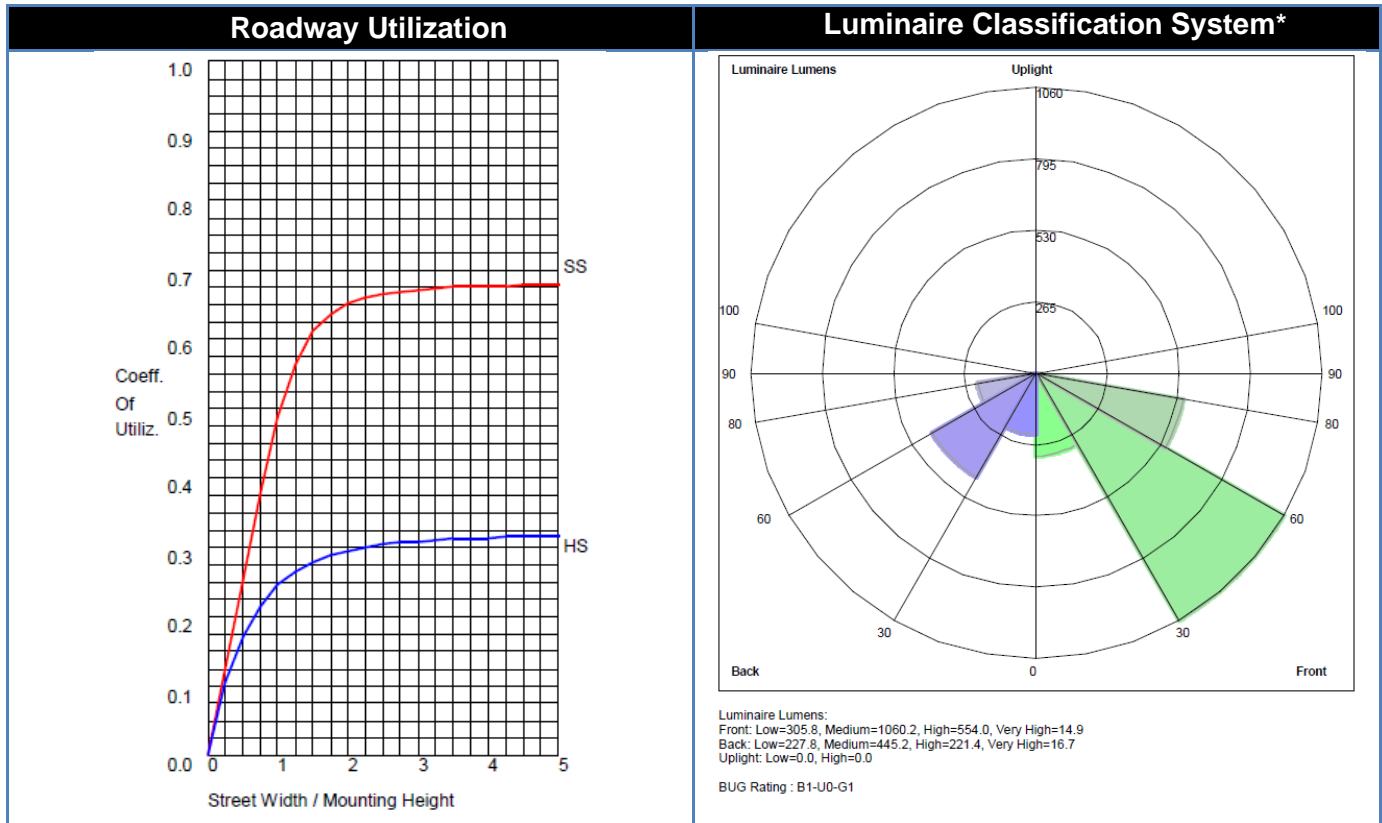
**Zonal Lumen Summary**

Zone	Lumens	% of Total	Zone	Lumens
0-20	258.4	9.1	0-10	69.2
0-30	533.6	18.7	10-20	189.2
0-40	903.1	31.7	20-30	275.2
0-60	2038.9	71.6	30-40	369.6
0-80	2814.3	98.9	40-50	506.4
0-90	2845.9	100.0	50-60	629.4
10-90	2776.7	97.6	60-70	555.8
20-40	644.8	22.7	70-80	219.6
20-50	1151.2	40.5	80-90	31.6
40-70	1691.6	59.4	90-100	0.0
60-80	775.4	27.2	100-110	0.0
70-80	219.6	7.7	110-120	0.0
80-90	31.6	1.1	120-130	0.0
90-110	0.0	0.0	130-140	0.0
90-120	0.0	0.0	140-150	0.0
90-130	0.0	0.0	150-160	0.0
90-150	0.0	0.0	160-170	0.0
90-180	0.0	0.0	170-180	0.0
110-180	0.0	0.0		
<b>Total</b>	<b>2845.9 LM</b>	<b>100%</b>		



Roadway Summary	Lumens	% Lamp
Distribution	TYPE II SHORT	
Downward Street Side	1934.8	68.0
Downward House Side	911.1	32.0
Downward Total	2845.9	100.0
Upward Street Side	0.0	0.0
Upward House Side	0.0	0.0
Upward Total	0.0	0.0
Total Lumens	2845.9	100

Luminaire Classification System (LCS)	Lumens	% Luminaire
FL - Front Low (0-30)	305.8	10.7
FM - Front Medium (30-60)	1060.2	37.3
FH - Front High (60-80)	554.0	19.5
FVH - Front Very High (80-90)	14.9	0.5
BL - Back Low (0-30)	227.8	8.0
BM - Back Medium (30-60)	445.2	15.6
BH - Back High (60-80)	221.4	7.8
BVH - Back Very High (80-90)	16.7	0.6
UL - Uplight Low (90-100)	0.0	0.0
UH - Uplight High (100-180)	0.0	0.0
BUG Rating*	B1-U0-G1	





**Candela Tabulations**

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
0	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4
1	740.2	741.5	742.9	743.4	743.6	743.1	743.0	742.5	743.3	741.5	741.2	740.1	738.9	738.1	736.3
2	739.4	740.7	742.2	742.6	742.8	742.5	742.3	741.9	742.5	740.8	740.6	739.5	738.3	737.6	735.6
3	738.4	740.0	741.4	741.7	742.0	741.7	741.4	741.1	741.7	740.0	739.8	738.7	737.5	736.8	734.8
4	737.5	739.2	740.6	741.0	741.2	741.0	740.8	740.3	741.0	739.3	739.2	738.2	736.9	736.2	734.3
5	736.8	738.6	739.9	740.4	740.8	740.4	740.4	740.0	740.7	739.0	738.7	737.8	736.6	736.0	733.9
6	736.1	737.7	739.1	739.5	739.9	739.9	739.8	739.6	740.4	738.8	738.6	737.6	736.4	735.7	733.6
7	735.3	736.4	737.9	738.5	738.9	739.1	739.1	739.1	740.2	738.6	738.2	737.4	736.2	735.3	733.2
8	733.6	735.1	736.4	737.1	737.5	738.0	738.1	738.3	739.4	738.0	737.8	736.9	735.8	734.7	732.5
9	732.2	733.3	734.6	735.4	736.1	736.5	737.0	737.4	738.8	737.4	737.5	736.7	735.6	734.2	731.5
10	730.1	731.2	732.7	733.6	734.6	735.1	735.8	736.1	737.9	736.8	737.0	736.2	734.9	733.5	730.4
11	728.0	728.9	730.5	731.7	732.7	733.6	734.6	735.2	737.0	736.2	736.4	735.3	734.1	732.3	729.3
12	725.6	726.4	728.2	729.4	731.0	732.0	733.5	734.4	736.4	735.5	735.7	734.9	733.2	731.1	728.0
13	723.3	724.6	726.4	727.8	729.4	730.8	732.7	733.7	735.8	735.0	735.3	734.4	732.7	730.1	726.4
14	721.4	723.1	725.1	726.8	728.3	730.0	731.8	733.1	735.4	734.3	734.8	733.7	731.7	729.1	724.5
15	720.1	722.2	724.2	725.8	727.5	729.4	731.1	732.6	734.8	733.6	733.6	732.3	729.9	727.1	722.1
16	719.2	721.6	723.6	725.2	727.1	729.0	730.9	732.2	734.4	733.0	732.7	731.2	728.3	724.9	719.3
17	718.6	721.3	723.5	725.1	727.2	729.1	731.1	732.3	734.3	732.6	732.2	730.2	726.8	722.7	716.3
18	718.3	721.3	723.5	725.5	727.5	729.9	731.8	732.7	734.2	732.4	731.5	728.8	724.5	719.7	712.5
19	718.7	721.9	724.3	726.3	728.4	731.1	732.8	733.7	734.7	732.4	730.8	727.2	722.4	716.5	708.3
20	719.7	723.2	725.8	727.9	730.2	733.0	734.9	735.4	736.0	733.1	730.7	726.2	720.5	713.6	704.3
21	721.5	725.6	728.1	730.4	733.2	735.8	737.7	737.9	738.0	734.1	731.1	725.4	718.7	710.6	700.0
22	724.3	729.0	731.6	734.1	737.9	740.1	741.7	741.3	740.8	736.1	732.0	725.5	717.3	708.1	695.9
23	728.7	733.9	736.6	739.2	743.3	745.7	746.5	745.6	744.1	739.1	733.8	726.1	716.8	706.1	692.5
24	733.9	739.2	741.9	745.2	749.2	752.2	752.2	750.6	748.6	742.9	736.7	727.7	717.4	704.7	689.6
25	739.7	744.7	747.8	751.0	755.7	758.5	758.6	756.6	754.3	747.7	740.6	730.4	718.5	704.3	687.4
26	745.7	751.4	754.6	758.1	763.1	765.5	765.6	763.3	760.7	753.4	745.3	733.6	720.0	704.6	685.9
27	752.5	758.7	762.1	766.0	770.8	772.7	772.3	770.1	767.3	759.4	750.5	737.6	722.3	705.2	684.9
28	759.4	765.8	769.7	773.4	778.0	780.2	778.8	777.0	773.9	765.6	756.0	741.9	725.3	706.2	684.5
29	767.7	775.0	778.6	782.4	787.3	788.6	786.9	784.2	781.5	772.6	762.4	747.4	729.2	708.6	685.0
30	777.4	785.4	789.6	794.6	799.2	798.4	796.3	792.9	790.0	780.5	769.7	754.1	734.4	712.1	686.7
31	787.7	795.9	800.8	806.8	811.2	809.6	806.1	802.6	798.6	788.9	777.2	760.8	740.0	715.6	689.1
32	798.2	806.4	811.5	818.3	823.3	821.4	816.9	813.3	808.6	798.3	785.5	768.2	746.2	720.2	692.0
33	810.9	818.6	823.9	831.8	838.3	834.9	830.9	826.0	820.8	809.5	796.4	777.3	754.2	727.4	696.4
34	822.6	831.0	837.2	846.9	854.1	851.1	846.8	841.3	835.3	823.0	808.6	788.2	763.4	735.0	701.5
35	834.6	842.4	848.9	859.6	867.5	866.4	862.6	857.2	849.8	836.6	820.8	799.7	773.2	742.3	706.8
36	846.8	853.3	859.8	871.2	881.1	881.4	879.2	874.7	865.4	851.5	834.7	812.0	783.9	752.2	714.3

**Candela Tabulations (Continued)**

	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
0	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4	740.4
1	736.0	735.6	734.7	731.0	734.6	735.9	736.2	736.5	738.3	739.2	740.5	741.7	742.0	743.7	743.2
2	735.3	735.1	734.3	730.4	734.0	735.6	735.9	736.1	738.0	739.0	740.4	741.5	741.9	743.4	742.8
3	734.7	734.4	733.6	730.0	733.5	734.9	735.1	735.3	737.3	738.1	739.2	740.0	740.2	741.4	740.5
4	734.2	733.9	733.1	729.5	732.9	734.1	734.5	734.4	736.1	736.5	737.3	737.8	737.3	738.3	736.5
5	733.8	733.5	732.6	728.9	732.2	733.5	733.5	733.3	734.8	734.7	735.0	734.6	733.7	733.7	731.0
6	733.4	732.9	732.1	728.3	731.4	732.6	732.6	732.1	733.0	732.7	731.8	730.6	728.3	726.3	722.4
7	732.8	732.0	731.0	727.3	730.2	731.3	731.1	730.1	730.7	729.2	727.1	724.2	720.1	716.2	711.1
8	731.8	731.0	729.8	725.9	728.8	729.7	728.9	727.6	727.0	723.9	720.5	716.0	709.9	704.8	697.5
9	730.6	729.4	728.0	723.7	726.4	727.1	726.0	723.8	721.9	717.8	712.4	706.2	698.0	690.8	682.1
10	729.0	727.5	725.7	721.2	723.6	724.0	722.4	719.3	716.0	710.5	702.7	693.7	683.2	673.4	664.6
11	727.6	725.6	723.5	718.7	720.9	720.7	718.6	714.1	709.7	701.5	690.8	679.5	666.3	656.2	646.9
12	725.8	723.1	720.8	715.3	717.2	716.4	713.6	708.0	701.8	690.4	677.8	664.4	650.8	641.4	631.8
13	723.7	720.2	717.5	711.3	712.4	711.0	706.7	700.0	691.4	678.3	664.2	649.3	636.1	626.8	617.1
14	721.0	717.0	713.5	706.6	707.0	704.7	699.2	690.6	679.5	664.5	648.4	633.2	620.0	610.3	600.8
15	718.1	713.4	709.2	701.8	701.4	697.9	691.3	680.9	667.2	649.0	631.6	616.8	603.7	594.6	584.8
16	714.4	709.0	704.0	696.1	694.6	689.9	681.8	669.6	653.2	633.2	616.3	601.6	589.4	580.6	570.2
17	710.3	703.8	698.0	688.8	686.3	680.5	670.4	656.1	637.7	618.3	601.4	586.9	575.2	565.3	554.2
18	705.5	698.1	691.0	681.2	677.6	670.5	658.9	642.1	622.1	602.7	585.0	571.1	558.0	547.4	536.0
19	700.6	692.0	683.8	673.2	668.8	660.7	647.3	627.8	607.1	586.7	568.6	554.5	540.8	530.2	518.1
20	695.3	685.4	676.3	664.5	659.1	649.5	633.8	612.9	591.2	571.4	553.8	539.4	525.8	514.8	503.1
21	689.6	678.5	668.0	654.6	648.3	637.4	619.3	597.0	575.1	556.1	538.2	523.6	510.1	498.1	486.7
22	684.2	671.8	660.1	645.5	637.6	625.4	605.7	582.2	559.6	539.9	521.5	506.9	492.3	480.3	468.4
23	679.6	666.0	652.8	637.2	627.5	613.4	592.7	567.8	544.7	523.9	506.0	490.9	476.2	464.6	451.4
24	675.1	660.0	645.6	627.7	616.7	600.9	578.9	553.5	530.0	509.2	492.0	476.4	462.3	450.1	436.2
25	670.9	654.4	638.5	618.7	606.3	588.9	565.5	539.6	516.0	495.3	478.0	462.3	447.7	434.1	419.6
26	667.8	649.9	632.5	611.1	597.4	578.8	554.4	527.5	503.3	482.0	464.0	447.7	431.9	417.2	401.9
27	665.2	645.5	626.7	604.2	588.7	569.1	544.1	516.3	491.6	470.0	452.0	434.7	418.1	403.2	387.5
28	663.0	641.6	620.8	596.9	579.9	559.1	533.5	505.8	480.8	459.2	441.2	423.4	406.2	390.6	375.7
29	661.6	638.1	615.5	590.2	572.2	549.9	523.8	495.7	470.7	449.1	430.0	411.8	393.3	377.5	363.5
30	661.4	636.0	611.8	585.1	566.0	542.3	515.3	486.8	461.3	439.2	419.1	399.8	380.7	365.3	351.8
31	661.5	633.9	608.3	580.3	560.0	535.4	507.2	478.6	453.1	430.9	410.2	389.6	370.8	355.9	343.1
32	662.0	632.5	605.4	576.2	554.6	528.9	499.4	470.8	445.8	423.6	402.2	381.0	362.3	347.2	335.7
33	664.2	633.1	604.1	573.7	550.7	523.6	493.1	464.2	439.2	416.5	393.7	372.1	353.2	338.7	328.3
34	667.5	634.4	604.1	572.6	548.2	519.2	487.6	458.6	433.4	410.0	386.0	364.0	345.4	332.0	322.4
35	670.5	635.8	604.5	571.5	546.1	515.6	482.7	453.7	428.6	404.7	380.1	357.8	339.9	327.4	317.8
36	674.8	638.3	606.1	572.3	545.3	513.1	479.0	450.0	425.2	400.5	375.4	352.9	335.2	323.0	314.2

**Candela Tabulations (Continued)**

	150	155	160	165	170	175	180
0	740.4	740.4	740.4	740.4	740.4	740.4	740.4
1	743.5	743.8	744.2	744.0	743.6	742.1	740.7
2	743.2	743.3	743.5	743.1	742.8	741.1	739.2
3	740.6	740.7	740.5	740.0	739.6	737.7	733.8
4	736.1	735.3	735.0	733.8	732.5	730.5	724.2
5	729.6	728.0	726.8	725.1	723.3	720.7	713.4
6	720.2	717.6	715.3	712.9	710.8	707.7	698.9
7	707.5	702.4	699.4	695.8	692.3	689.6	677.8
8	691.5	684.8	681.0	676.8	673.0	670.6	659.1
9	674.6	668.4	663.2	660.2	656.9	654.5	645.4
10	656.7	650.6	646.8	643.6	641.2	638.9	630.5
11	639.8	634.3	630.8	626.9	625.1	622.9	614.2
12	624.8	620.0	616.0	612.7	611.0	608.9	600.2
13	610.6	606.5	602.4	599.6	598.2	595.6	588.1
14	595.2	590.4	587.2	583.8	582.5	580.4	571.4
15	578.8	573.3	569.6	565.8	564.7	562.9	551.9
16	563.1	557.4	552.4	549.1	547.7	545.7	534.7
17	547.2	541.0	535.3	532.0	530.3	528.6	518.7
18	528.9	520.7	516.1	511.4	509.0	507.5	495.8
19	509.8	501.2	495.7	490.7	487.0	485.0	470.6
20	492.6	484.4	477.9	472.9	467.9	465.0	451.4
21	476.2	466.6	459.5	453.9	447.9	444.6	432.4
22	457.4	445.8	437.9	430.8	424.6	421.3	408.1
23	438.1	426.8	417.8	410.4	403.8	400.0	386.4
24	422.3	410.8	401.4	394.0	387.7	383.6	372.2
25	406.1	394.6	385.3	377.8	372.1	368.2	358.3
26	389.3	378.8	369.2	362.0	356.6	352.8	343.3
27	375.2	365.7	356.8	349.9	345.0	341.1	332.2
28	364.4	355.2	347.3	340.8	336.2	332.5	325.3
29	353.3	344.5	337.5	331.5	327.2	324.3	317.9
30	342.3	334.4	328.2	323.1	319.1	316.8	310.7
31	334.1	327.0	321.7	317.3	313.7	311.3	306.5
32	327.8	321.2	316.4	312.8	309.7	307.5	304.0
33	321.4	315.5	311.8	309.1	306.8	304.8	301.7
34	315.9	311.2	308.6	307.2	305.7	303.5	301.4
35	312.0	308.8	307.5	307.2	306.3	303.9	302.7
36	309.3	307.5	308.1	308.9	308.5	306.1	305.7

**Candela Tabulations (Continued)**

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
37	859.2	865.4	871.5	883.7	896.3	898.1	898.9	895.1	884.7	870.4	852.0	826.4	797.1	764.8	723.3
38	871.0	876.9	882.0	895.0	910.0	915.6	919.0	918.3	906.3	890.3	869.8	842.9	811.3	775.6	732.0
39	881.9	885.8	890.0	903.9	922.2	930.8	936.6	937.7	929.0	910.0	886.9	859.6	825.5	785.8	741.1
40	891.9	893.8	897.5	913.7	932.4	943.7	953.0	955.8	949.5	932.2	908.1	877.6	841.0	799.6	753.1
41	898.9	900.1	903.9	922.4	941.4	955.6	968.7	974.3	970.9	956.0	932.9	899.8	859.1	815.4	766.6
42	903.2	903.0	907.9	927.7	948.7	965.5	982.2	991.6	991.5	978.7	954.2	920.7	877.0	829.2	779.2
43	903.6	902.9	909.4	930.2	953.4	973.1	993.5	1007.0	1010.3	1000.2	976.0	942.1	895.6	844.6	793.2
44	902.3	900.1	908.5	930.7	955.2	978.5	1004.8	1022.0	1029.9	1022.0	1001.3	966.3	919.1	864.4	809.9
45	897.9	893.5	903.4	926.3	953.7	981.1	1013.3	1036.9	1049.1	1045.2	1027.8	994.2	946.8	886.5	828.1
46	889.9	884.5	896.0	920.3	951.4	982.6	1020.3	1049.3	1066.5	1067.0	1052.1	1021.3	970.9	908.0	846.6
47	877.2	872.3	885.3	911.7	944.3	981.7	1024.2	1060.8	1082.9	1088.3	1078.7	1049.5	998.1	935.3	867.9
48	861.6	854.5	868.3	898.1	933.5	975.9	1024.3	1069.4	1098.1	1110.1	1107.2	1081.8	1032.4	970.6	896.9
49	841.8	832.1	848.0	879.2	919.7	964.0	1020.2	1073.9	1111.5	1131.7	1135.8	1117.4	1070.8	1007.7	928.1
50	817.2	807.4	826.9	858.4	905.6	951.0	1014.3	1076.0	1123.6	1151.3	1164.9	1157.8	1114.7	1047.8	966.9
51	788.5	777.7	800.3	834.6	882.5	934.6	1000.9	1072.4	1132.2	1169.9	1197.0	1202.3	1166.6	1101.8	1015.7
52	756.0	742.6	766.1	802.5	852.2	909.7	977.9	1062.4	1133.7	1187.4	1229.1	1251.8	1228.0	1165.2	1074.8
53	719.1	706.9	732.8	768.5	822.0	880.8	956.5	1048.8	1133.7	1203.5	1262.5	1302.2	1293.2	1231.5	1136.9
54	680.0	671.0	698.5	735.8	790.5	850.9	931.5	1030.8	1130.2	1217.2	1295.6	1351.8	1362.7	1305.4	1208.1
55	640.6	628.9	658.4	695.5	746.1	812.4	893.7	1002.5	1117.1	1223.4	1324.5	1403.7	1435.2	1387.3	1291.1
56	598.5	584.2	613.2	646.8	696.8	768.1	855.5	969.9	1097.9	1224.0	1347.9	1452.6	1505.2	1466.1	1373.3
57	552.9	538.5	568.8	601.2	655.4	725.9	822.5	936.9	1078.6	1221.2	1368.5	1494.6	1567.2	1538.5	1444.8
58	501.6	482.4	514.1	552.1	606.2	679.5	777.2	896.6	1047.2	1209.6	1376.2	1524.7	1617.0	1605.8	1512.6
59	441.0	418.0	448.0	489.2	543.1	621.7	717.9	845.9	1005.7	1182.1	1370.3	1540.9	1653.9	1658.1	1568.9
60	377.4	360.4	389.3	428.7	486.8	562.2	662.1	792.6	963.4	1151.0	1362.0	1551.0	1681.1	1695.1	1610.1
61	323.9	314.0	339.7	376.9	431.0	505.3	605.4	737.7	919.0	1118.9	1345.9	1552.7	1697.3	1717.6	1636.8
62	280.4	273.4	293.4	325.3	370.6	441.5	538.8	671.7	857.0	1071.1	1309.2	1534.1	1693.3	1723.1	1647.9
63	244.9	239.4	255.3	280.6	319.8	383.1	476.6	604.6	793.2	1008.4	1261.5	1498.6	1671.6	1710.5	1639.3
64	217.8	214.4	228.2	248.8	281.9	337.3	425.2	547.0	734.2	951.6	1208.0	1455.9	1634.4	1676.6	1610.8
65	195.1	192.0	203.4	221.4	248.8	295.1	369.8	491.6	667.6	889.5	1141.0	1396.9	1574.2	1619.1	1556.1
66	174.8	171.0	180.4	194.8	217.9	255.1	319.5	433.5	596.9	817.1	1063.0	1314.5	1491.5	1537.1	1476.5
67	156.8	154.9	163.1	173.8	193.4	225.5	281.0	384.0	538.1	747.8	988.4	1227.7	1400.2	1439.9	1383.3
68	142.3	141.9	149.8	158.2	172.1	200.4	248.4	339.2	482.3	674.3	907.4	1129.9	1295.2	1328.4	1278.2
69	130.1	129.5	136.9	143.4	153.5	176.5	217.8	293.8	419.5	587.2	810.1	1014.6	1166.2	1199.7	1155.3
70	119.8	118.8	125.4	130.5	138.6	157.5	192.4	254.7	361.8	508.6	707.4	897.5	1036.9	1074.7	1034.4
71	109.9	109.3	115.3	120.3	127.6	142.6	171.1	224.0	310.0	437.2	610.9	788.7	915.1	962.8	919.9
72	99.4	98.8	103.7	109.6	116.5	129.6	150.8	193.0	258.8	362.5	515.7	679.2	793.2	843.6	808.5
73	88.4	87.6	91.7	97.7	106.1	117.7	133.8	165.5	218.0	296.7	431.8	581.6	677.1	721.2	704.9

**Candela Tabulations (Continued)**

	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
37	681.8	643.1	609.6	575.7	546.8	512.7	477.0	447.9	422.9	397.1	370.6	348.1	330.5	318.9	310.7
38	689.0	649.2	614.5	579.2	549.4	513.3	476.3	447.3	421.5	394.5	367.0	344.0	327.1	315.8	308.3
39	696.4	655.5	619.8	582.9	552.7	514.9	476.6	447.6	421.2	393.0	365.1	341.6	324.7	313.6	307.9
40	706.5	664.4	627.3	589.8	558.6	518.7	479.2	449.1	422.2	392.6	363.6	339.6	322.5	312.0	309.9
41	719.0	675.5	636.6	599.6	566.5	525.0	483.6	451.5	424.2	392.4	362.1	337.8	320.4	312.3	314.9
42	730.9	686.0	646.5	608.8	574.6	531.5	488.5	454.7	426.6	393.0	362.0	337.0	319.8	315.0	321.5
43	743.0	697.1	657.2	618.5	583.9	539.5	494.3	459.1	430.5	394.9	363.4	337.1	321.2	320.3	329.3
44	757.6	710.8	670.3	631.2	596.2	550.1	502.2	464.6	435.5	397.8	365.2	338.5	324.8	327.9	339.4
45	774.5	726.6	685.0	645.8	609.1	561.1	510.5	470.5	441.4	401.4	367.6	341.7	331.4	337.7	349.9
46	791.3	741.7	700.5	660.3	621.4	571.3	518.8	476.7	447.5	405.2	371.1	346.5	339.2	347.2	357.8
47	810.3	759.7	717.6	676.2	634.3	582.0	527.7	484.3	454.2	409.8	376.4	353.6	349.2	356.9	360.8
48	834.4	781.9	736.7	692.6	648.1	592.8	537.0	492.7	460.4	414.9	383.5	362.7	360.6	363.7	355.8
49	862.6	806.3	757.5	708.8	662.0	603.8	545.6	500.5	465.9	421.0	391.6	373.3	369.2	363.4	341.0
50	894.8	833.0	779.5	725.8	676.0	614.5	553.5	506.9	470.9	426.9	400.2	382.6	372.0	353.7	322.5
51	938.2	866.9	805.3	748.0	692.4	626.4	560.9	511.8	475.4	433.1	408.8	387.4	364.3	333.4	301.1
52	989.6	908.8	837.4	773.8	710.8	638.3	566.6	514.6	478.7	438.2	412.9	381.2	343.8	309.1	281.7
53	1043.9	953.8	873.6	798.0	728.2	649.1	570.5	516.1	480.4	441.7	407.6	362.6	319.8	290.8	269.8
54	1102.9	1003.6	913.9	825.8	747.3	660.2	574.8	517.2	480.2	439.1	392.8	338.9	300.7	279.6	263.4
55	1174.7	1063.6	962.3	860.6	770.0	673.6	580.9	516.8	475.1	428.1	370.3	318.6	288.5	273.2	258.4
56	1249.2	1124.9	1010.6	897.0	792.6	685.8	583.9	513.2	466.9	411.9	351.7	305.9	281.6	269.0	254.5
57	1313.3	1179.6	1055.1	928.5	810.9	694.9	582.9	509.2	456.8	398.1	339.8	298.0	277.4	265.9	252.6
58	1373.4	1232.5	1097.8	959.4	828.1	701.9	582.1	503.3	446.3	386.8	330.1	291.6	273.2	262.6	251.5
59	1430.2	1281.6	1138.5	988.6	845.0	706.1	577.5	493.9	433.9	375.5	320.8	285.2	268.6	259.3	250.0
60	1472.9	1317.5	1168.6	1007.4	851.5	702.8	566.6	478.1	418.6	362.9	311.7	279.1	264.3	256.7	247.7
61	1501.5	1342.6	1187.3	1018.2	849.7	691.7	547.7	456.0	398.9	347.6	302.1	273.0	259.9	253.9	244.9
62	1517.2	1357.2	1195.8	1019.3	839.6	673.4	520.0	427.6	375.1	329.4	290.3	266.0	254.7	250.2	241.1
63	1513.7	1356.2	1193.1	1007.1	819.8	645.3	484.5	395.0	349.7	309.9	276.9	258.5	249.9	245.9	236.6
64	1490.4	1337.4	1174.6	984.3	789.5	608.4	444.2	360.9	324.0	290.4	264.1	250.5	244.4	241.1	231.7
65	1444.2	1299.7	1137.8	950.0	749.4	563.1	400.0	327.8	297.8	270.5	251.0	241.3	237.9	234.6	225.5
66	1369.4	1233.9	1078.0	895.8	696.4	511.1	356.5	296.0	271.2	250.5	238.0	231.3	229.9	227.0	218.1
67	1279.6	1150.5	1001.5	826.6	635.6	458.0	318.6	268.9	247.1	231.9	225.7	221.6	221.6	218.4	210.7
68	1179.4	1054.9	913.9	750.8	573.9	406.8	287.4	244.9	226.4	217.4	213.9	211.1	212.0	209.1	202.3
69	1067.0	950.5	818.9	674.7	511.6	358.6	257.1	220.8	207.7	202.0	202.3	200.1	200.9	198.5	193.5
70	952.9	844.1	727.3	602.1	453.2	317.3	229.4	198.0	190.7	188.0	191.4	190.2	190.2	187.6	184.1
71	843.1	747.0	644.4	534.3	401.6	282.3	205.0	178.7	175.0	175.0	180.9	180.8	180.3	177.7	174.8
72	735.3	654.0	567.8	469.9	354.5	251.7	183.2	162.2	160.5	162.8	169.9	170.7	169.9	167.2	164.7
73	640.5	569.4	498.2	413.3	313.0	223.5	163.6	147.3	146.9	151.6	158.9	159.4	159.2	156.6	154.0

**Candela Tabulations (Continued)**

	150	155	160	165	170	175	180
37	306.9	307.6	311.1	313.7	313.6	311.1	312.1
38	306.7	310.6	316.3	320.1	319.5	317.4	319.4
39	308.9	315.1	321.7	325.6	324.5	323.0	324.4
40	314.2	321.3	327.5	331.2	330.4	328.7	329.4
41	321.5	328.8	334.1	336.2	335.7	333.9	333.3
42	329.4	336.1	339.7	339.6	337.8	335.6	332.3
43	337.8	342.7	342.8	339.8	336.2	333.5	328.9
44	347.0	347.3	342.0	334.8	328.8	326.0	317.1
45	353.4	346.1	334.4	323.2	314.1	309.8	294.0
46	353.5	339.0	321.7	308.2	296.7	290.1	274.2
47	347.1	325.7	305.0	289.3	277.2	270.4	258.6
48	331.5	305.5	283.4	267.8	257.9	253.8	245.5
49	311.7	285.0	263.9	251.6	246.7	244.4	239.1
50	291.6	268.2	251.4	243.9	241.5	239.8	236.7
51	273.9	254.7	243.7	240.1	238.5	237.0	234.3
52	260.7	245.8	240.1	237.4	235.5	233.1	228.9
53	253.2	241.8	237.0	234.2	231.5	228.9	224.4
54	248.6	239.2	234.5	231.2	228.0	225.2	220.7
55	246.2	236.8	231.6	227.9	224.5	221.3	216.3
56	245.1	234.8	229.3	225.1	220.9	217.0	211.6
57	244.1	233.3	227.4	222.6	217.6	213.0	208.0
58	242.6	231.8	225.4	219.5	213.8	208.5	203.8
59	240.5	230.0	222.6	215.6	209.2	203.5	198.4
60	237.8	227.4	219.2	211.4	204.5	198.9	194.1
61	234.4	224.2	215.6	207.1	200.1	194.7	190.6
62	230.1	220.0	210.6	202.3	195.5	190.3	186.4
63	225.0	215.0	205.1	197.2	190.8	186.5	182.8
64	219.7	209.9	200.2	192.4	187.1	183.4	179.5
65	214.0	204.4	194.8	188.0	183.2	179.4	174.3
66	207.2	197.9	189.0	182.7	177.4	172.7	166.1
67	200.4	191.5	183.1	176.3	169.7	164.8	158.0
68	193.6	185.0	176.2	167.8	161.8	157.0	150.8
69	185.5	176.7	166.5	157.5	153.6	149.1	142.8
70	176.5	166.8	155.9	148.5	146.4	141.9	135.4
71	166.9	156.4	147.2	141.7	140.1	135.3	129.7
72	156.5	145.8	139.0	135.9	133.0	128.1	122.4
73	144.6	135.3	131.4	129.4	123.9	118.0	108.2

**Candela Tabulations (Continued)**

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
74	77.6	77.4	81.5	86.8	96.9	107.2	120.2	144.6	185.8	247.7	364.1	499.0	582.7	614.4	609.6
75	67.1	67.0	70.7	75.7	85.8	96.7	107.4	124.6	156.8	210.6	303.1	415.0	492.6	516.5	511.4
76	57.2	56.7	59.4	64.4	73.6	84.4	94.6	107.5	132.8	179.9	250.5	335.8	406.3	426.6	420.0
77	48.7	47.6	50.2	54.4	62.8	72.1	83.2	94.7	114.3	152.1	210.0	273.1	330.8	351.7	346.4
78	40.6	39.1	41.0	45.2	51.8	59.8	70.8	81.5	97.9	126.1	175.0	224.8	265.8	283.8	281.2
79	33.2	31.1	32.4	35.7	40.6	47.9	58.2	67.6	82.5	103.1	141.6	179.0	210.1	219.7	220.1
80	26.7	24.3	25.7	27.8	31.5	37.9	46.6	55.3	66.9	82.9	111.5	138.9	162.2	168.2	169.9
81	20.9	18.8	19.9	21.4	24.5	29.0	36.0	44.5	52.9	64.9	85.1	103.4	122.7	127.0	127.3
82	15.8	13.9	14.7	15.7	17.5	21.0	26.4	32.8	39.4	49.1	62.1	73.9	87.2	91.8	90.6
83	11.7	10.0	10.6	11.1	12.2	14.9	19.0	23.3	27.5	34.5	42.8	51.3	59.4	62.2	63.6
84	8.4	7.2	7.6	8.1	8.9	10.5	13.1	16.0	18.8	22.8	27.8	33.1	37.9	38.7	41.5
85	6.0	5.1	5.4	5.8	6.5	7.5	8.7	10.5	12.2	14.0	16.7	19.9	22.6	23.5	25.3
86	4.1	3.5	3.9	4.4	4.8	5.3	6.0	6.8	7.9	8.8	10.3	12.2	13.6	14.4	15.5
87	2.7	2.5	3.0	3.4	3.6	3.9	4.3	4.9	5.2	5.8	6.5	7.4	8.2	9.3	9.9
88	1.6	1.8	2.4	2.7	2.8	3.0	3.3	3.8	3.9	4.2	4.6	5.1	5.5	6.1	6.6
89	1.1	1.4	1.9	2.2	2.2	2.3	2.6	3.1	3.2	3.4	3.7	3.9	4.2	4.4	4.7
90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

**Candela Tabulations (Continued)**

	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
74	560.3	498.1	437.0	364.8	275.7	195.8	145.4	132.8	135.0	140.8	147.8	147.7	148.0	146.6	142.2
75	480.1	429.9	378.6	316.8	239.1	168.8	127.9	118.7	123.0	129.8	136.1	135.6	136.2	135.0	129.9
76	398.4	363.5	321.0	270.0	203.8	143.6	111.0	104.8	110.9	118.0	123.9	123.4	124.7	122.5	117.0
77	327.2	304.7	269.1	228.4	173.1	122.7	96.0	92.0	98.7	105.7	111.8	111.5	112.0	109.8	104.0
78	267.7	252.7	224.3	190.9	146.1	104.2	82.8	80.9	86.9	94.3	99.9	100.0	98.9	96.1	92.3
79	214.4	203.8	183.6	157.4	121.8	87.2	70.8	70.1	75.4	82.4	88.2	88.7	86.3	82.0	80.0
80	166.8	160.9	144.9	128.1	99.5	70.7	59.7	59.9	64.6	70.6	76.6	77.3	74.4	69.7	67.5
81	128.1	122.3	111.9	100.9	78.7	56.0	49.5	50.3	54.7	59.7	64.9	65.7	63.0	59.8	57.7
82	91.2	90.3	84.0	75.5	60.3	44.1	40.7	41.7	45.5	50.0	54.5	55.3	52.7	50.6	49.6
83	64.0	64.6	60.6	54.6	44.2	35.0	32.9	34.3	37.1	41.2	44.9	45.7	44.1	42.3	41.9
84	43.7	44.4	42.9	39.5	32.1	27.5	26.6	27.8	30.1	33.8	36.8	37.4	36.2	35.1	34.8
85	28.2	28.6	28.1	27.1	22.8	21.1	21.0	22.2	24.3	27.3	29.4	29.7	29.2	29.1	28.6
86	17.6	18.2	18.0	17.6	15.8	15.5	16.2	17.4	19.3	21.7	23.1	23.5	23.4	23.6	23.5
87	10.7	11.4	11.1	11.1	10.7	11.2	12.2	13.5	15.1	17.0	18.0	18.4	18.6	18.9	18.9
88	6.8	7.5	7.2	7.1	7.6	8.3	9.3	10.3	11.6	13.0	13.8	14.5	14.9	15.3	15.4
89	4.8	5.0	4.8	4.9	5.6	6.5	7.3	8.0	8.8	9.9	10.5	11.2	11.7	12.3	12.3
90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0



**Candela Tabulations (Continued)**

	150	155	160	165	170	175	180
74	134.1	126.6	123.5	120.2	112.8	106.8	99.1
75	123.6	118.8	114.6	108.0	102.3	97.8	91.1
76	113.5	110.2	104.5	98.5	93.7	89.2	82.6
77	103.7	101.2	95.8	89.9	85.2	81.4	74.7
78	93.0	91.1	86.3	81.1	77.2	74.0	67.3
79	82.4	79.8	76.2	72.2	69.2	66.4	60.3
80	71.8	69.5	66.4	63.3	61.5	59.2	53.7
81	60.3	59.1	56.7	55.1	53.6	52.4	47.3
82	50.4	49.8	48.3	47.6	46.6	45.8	41.4
83	41.9	41.5	41.1	40.9	40.3	39.6	35.4
84	34.9	34.6	34.6	34.8	34.7	33.8	29.9
85	28.7	28.6	28.9	29.4	29.5	28.4	24.7
86	23.2	23.0	23.4	24.3	24.5	23.3	20.2
87	18.6	18.5	18.5	19.3	19.6	18.7	15.8
88	15.0	14.9	14.7	15.3	15.4	14.6	11.8
89	12.0	11.8	11.8	12.2	12.1	11.1	8.1
90	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*NOTE: The device under test emits no detectable uplight, as defined by ANSI/IES LM-75-19.*

## Test Date(s):

Equipment	Date
2M Sphere	02-05-2024
Type C Goniophotometer	02-05-2024

## Integrating Sphere Equipment:

Description	Manufacturer	Model	Serial Number
2M Sphere	Labsphere	ILLUMIA PLUS 3020-195-4PI	1115184557
CCD Array Spectrometer	Labsphere	MC-9801:3683L	98010844
Lamp Power Supply	Labsphere	LPS-525-42	190615319
Programmable AC Source	Chroma	61602	616020003698
Power Analyzer	Xitron	XT2640	2641AD2006002

## Goniophotometer Equipment:

Description	Manufacturer	Model	Serial Number
Type C Goniophotometer	LSI / UL	6440T	6440PN2028
Spectroradiometer	Gooch & Housego	770VIS/NIR	12415212
Spectrometer	Inphora, Inc	PDET 31	130627
Programmable AC Source	Chroma	61602	616020002300
Power Analyzer	Xitron	XT2640	2641AD2006004

## Test Methods Used:

Title	Description
ANSI C82.77:2002	Harmonic Emission Limits- Related Power Quality Reqt's for Lighting Equipment
CIE Pub.13.3:1995	Method of Measuring and Specifying Color Rendering of Light Sources
CIE Pub.15:2018	Colorimetry
IES LM-58:1994	Spectroradiometric Measurements
ANSI/IES LM-79:2008	Electrical and Photometric Measurements of Solid-State Lighting Products

## Reference Standard Used:

Equipment	Description
2M Sphere	Tungsten Halogen Omni-Directional 35W Calibration Lamp, Serial Number E4
Type C Goniophotometer and Spectrometer	Tungsten Halogen Omni-Directional 500W Calibration Lamp, Serial Numbers 16C293, 16C294, 16C295. For color calibration of spectrometer, 13C074.

### Disclaimers:

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The results contained in this report pertain only to the tested sample.

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### Exceptions:

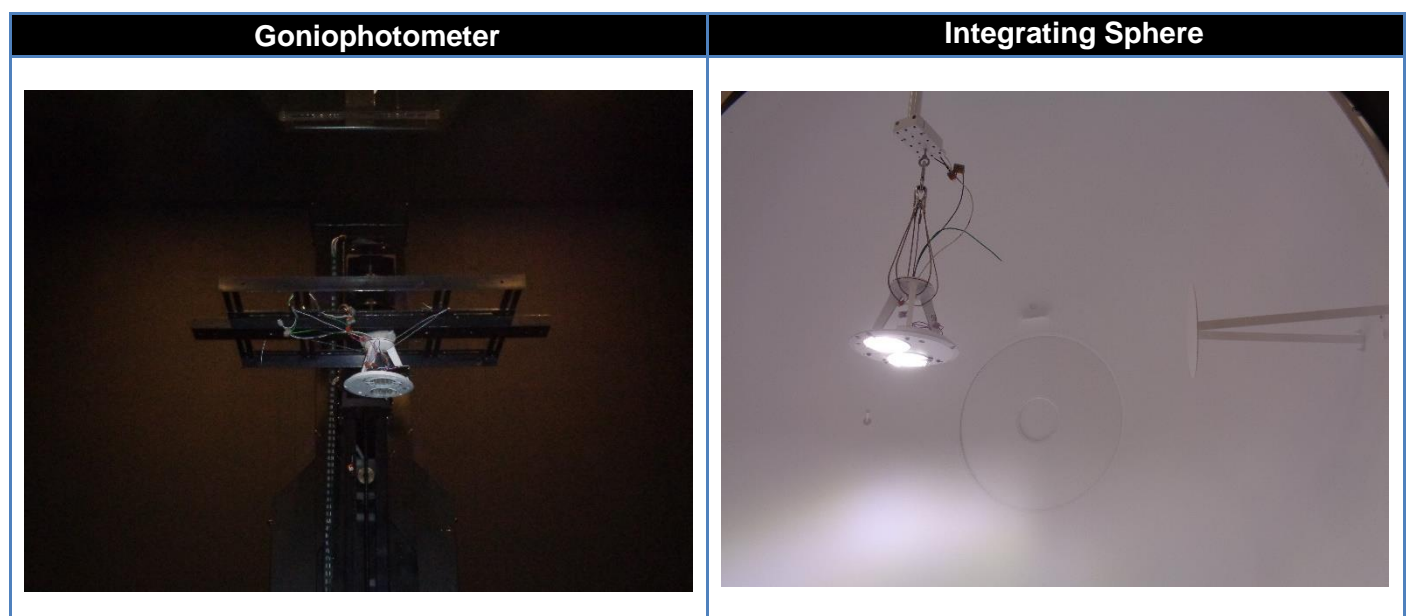
Data in this report tested under Non-Standard Conditions (i.e. temperature outside the allowed acceptance interval for the equipment/test) are identified with (~).

Data in this report not covered by the NVLAP accreditation, are identified with (\*).

In the event testing is subcontracted, subcontracted equipment was used, or performed by the subcontracted laboratory identified in the equipment list of this report, test results in this report marked with the symbol (^).

### Additional Comments:

The photos below are intended to show the orientation and fixturing/set-up of the units under test. These are critical to understanding the results of the test given the sensitivity of many products and measurement systems to orientation and set-up considerations, and also for reproducing the conditions of the test.



**Document Revision History:**

Each subsequent revision of this report replaces the preceding report.

Date	Rev	DCN #	Change at the time of this test	By	Approval
02/05/2024	A	DMS	Origination	J. Rocco	M. Hubbard

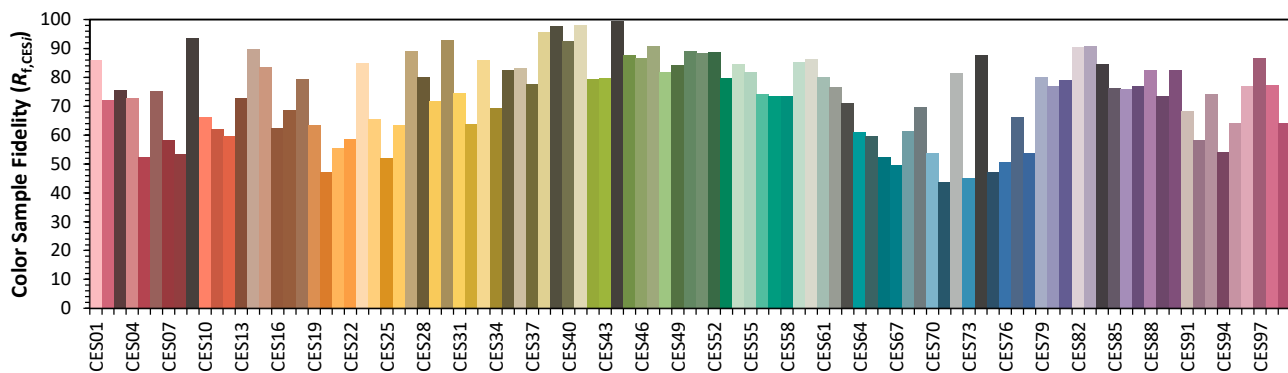
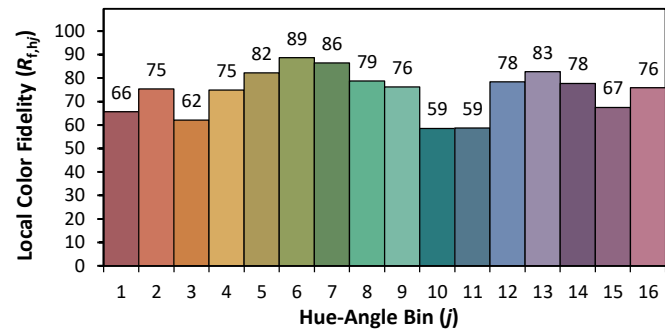
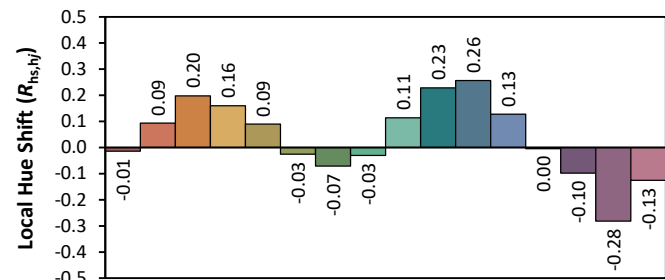
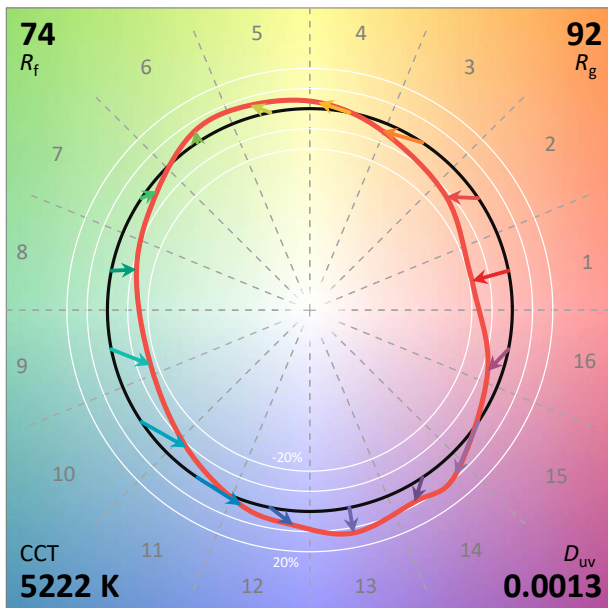
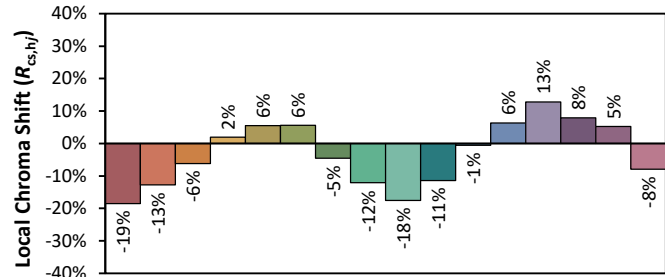
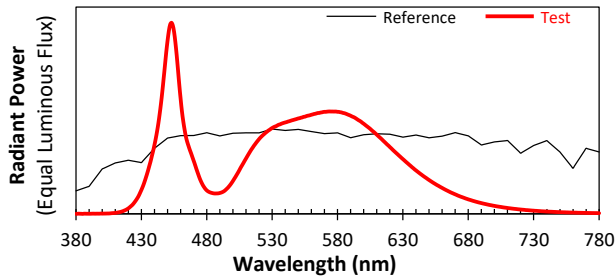
## ANSI/IES TM-30-18 Color Rendition Report

Source: OSQP-C-3L-50K7-3R-UL (Light Engine)

Manufacturer: Cree Lighting

Date: 2/5/2024

Test: PL18137-001



Notes:

x 0.3393

y 0.3495

u' 0.2083

v' 0.4828

CIE 13.3-1995  
(CRI)

R<sub>a</sub> 73

R<sub>g</sub> -32