

**Report Number:** PL18135-001A  
**Model:** OSQP-C-3L-30K7-3R-UL (Light Engine)  
**Issue Date:** 02/02/2024

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

**Prepared For:**

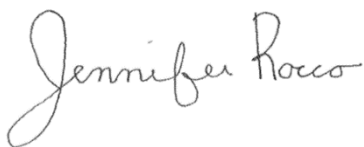
Tammy Lehrmann

Cree Lighting

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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-30K7-3R-UL (Light Engine)
Serial Number	18135
LED Type	SSC STW7C12C-E0

Product Description
OSQP-C Pathway Luminaire (Light Engine), 3L Lumen Package, 3000K 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	2723.2	2739.0	lm
Efficacy	138.08	139.18	lm/W
Correlated Color Temperature (CCT)	3155	K	
Color Rendering Index (CRI)	72		
R <sub>9</sub>	-30		
Duv	-0.0006		
TM-30 R <sub>f</sub> *	74		
TM-30 R <sub>g</sub> *	95		
TM-30 R <sub>cs,h1</sub> *	-16.0%		
S/P Ratio*	1.25		

	Sphere		Goniophotometer		
Electrical Measurements	120V	277V	120V	277V	
Input Wattage	19.72	19.88	19.68	19.87	W
Input Current	0.170	0.075	0.169	0.075	A
Input Voltage	120.09	277.18	120.20	277.27	V
Power Factor	0.967	0.959	0.971	0.957	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.09	0.05	0.19	0.05	%
Total Harmonic Distortion (Amperage)	12.70	10.43	12.37	10.37	%

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

Luminous Intensity Distribution	Goniophotometer	
Max Candela	1815.07	Cd
Angle of Max Candela (Horizontal)	60	°
Angle of Max Candela (Vertical)	64	°

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	51	30	min
Total Operating Time (Stabilization + Test)	61	50	min
Ambient Temperature	24.54	25.3	°C

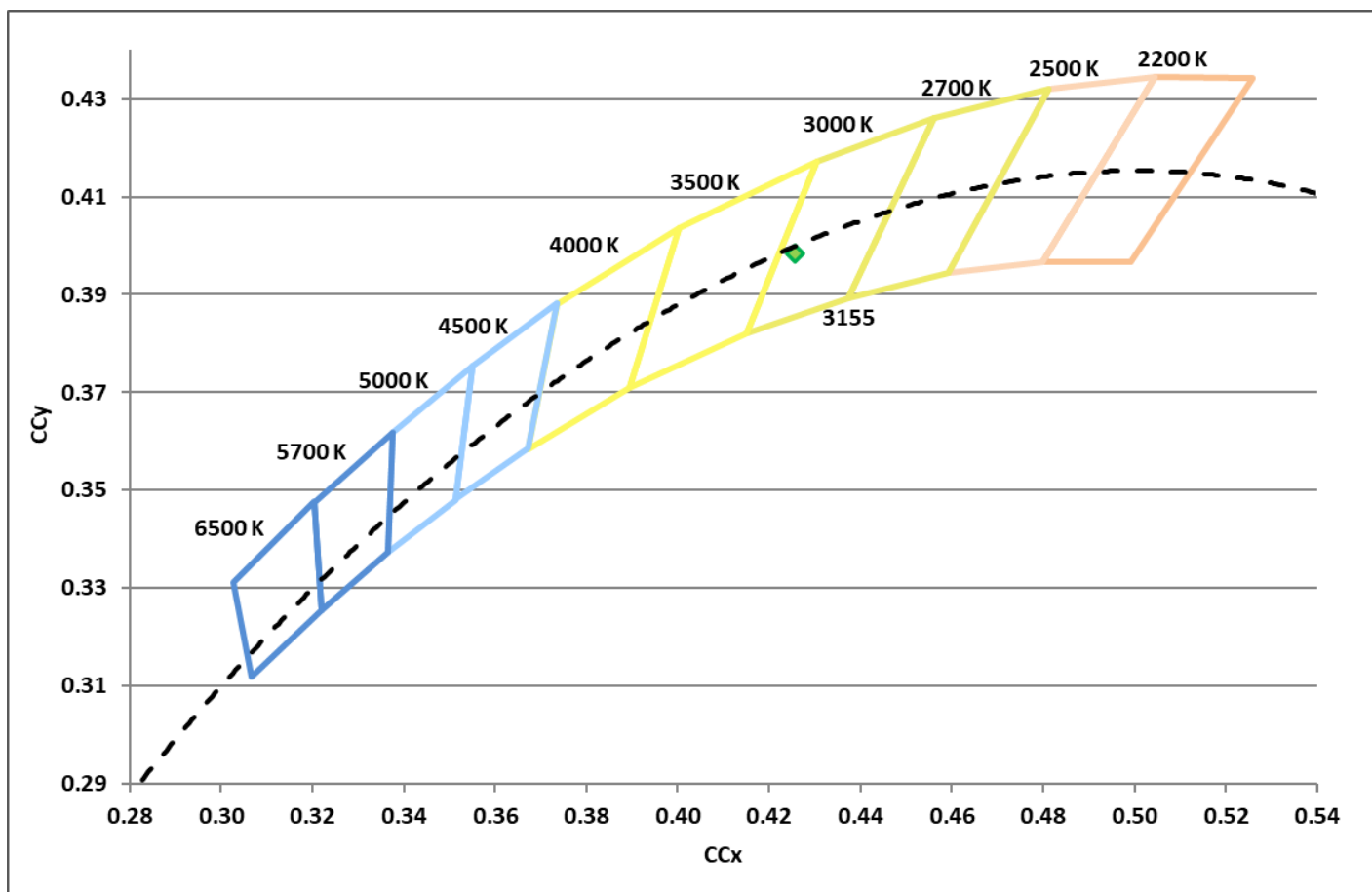
## Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.4256	0.3985	0.2456	0.3450	0.2456	0.5175	-0.0006

## Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
72	69	81	91	69	68	73	79	46	-30	55	64	45	71	95

## Chromaticity Diagram



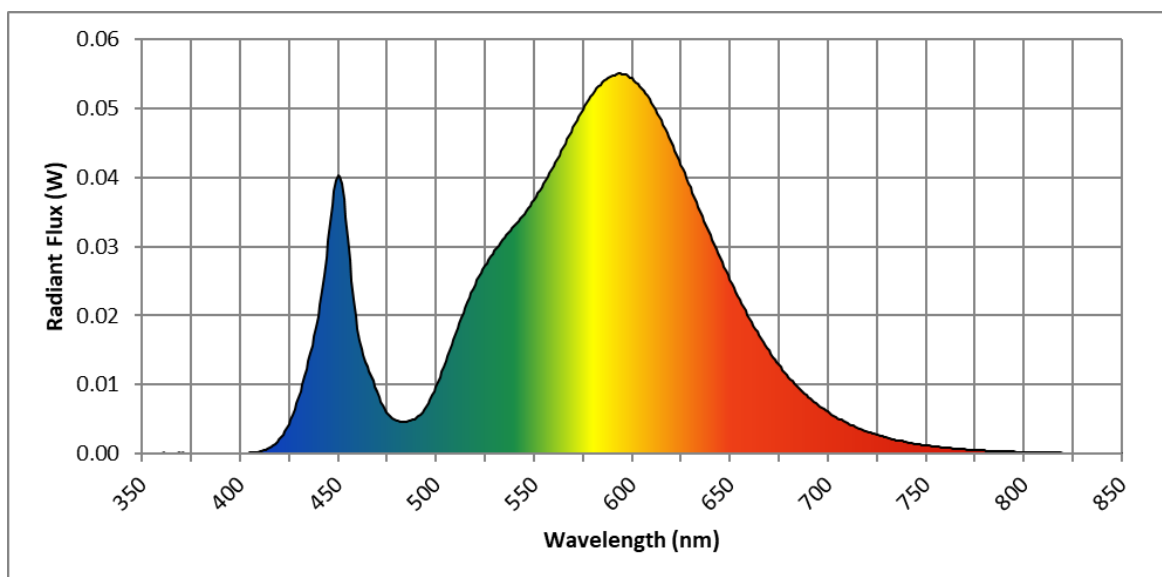
NOTE: The Chromaticity Diagram shown above references table A1 specification for 7-step quadrangles referenced in ANSI C78.377-2017.

**Spectral Distribution**

$\lambda$ (nm)	W/nm	$\lambda$ (nm)	W/nm	$\lambda$ (nm)	W/nm
360	0.000077	530	0.029379	700	0.006065
370	0.000005	540	0.032929	710	0.004428
380	0.000042	550	0.036747	720	0.003221
390	0.000026	560	0.041589	730	0.002340
400	0.000037	570	0.047257	740	0.001689
410	0.000316	580	0.051979	750	0.001219
420	0.002033	590	0.054735	760	0.000886
430	0.008173	600	0.054318	770	0.000628
440	0.019942	610	0.050831	780	0.000459
450	0.040252	620	0.045168	790	0.000312
460	0.017954	630	0.038501	800	0.000236
470	0.008975	640	0.031605	810	0.000164
480	0.004804	650	0.025208	820	0.000107
490	0.005156	660	0.019638	830	0.000074
500	0.009702	670	0.014909		
510	0.017332	680	0.011122		
520	0.024510	690	0.008241		

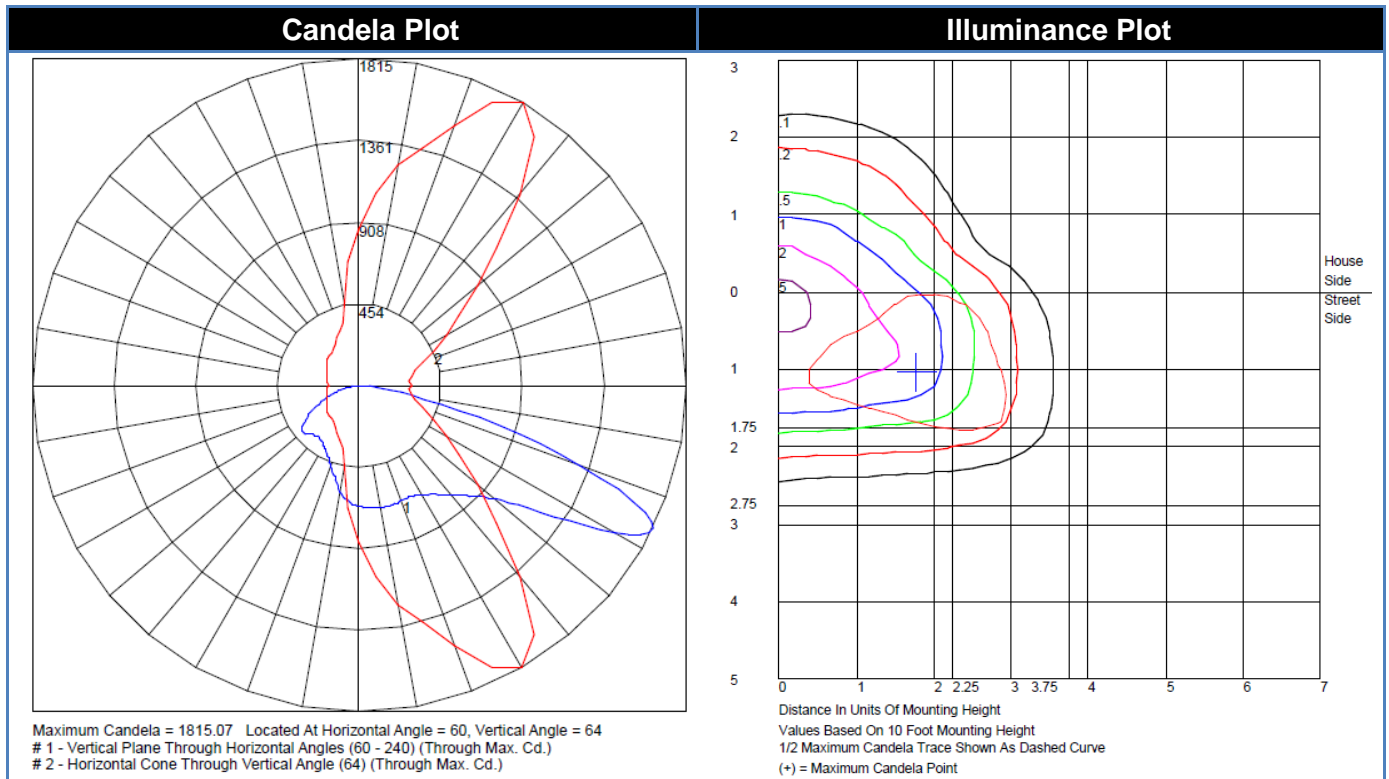
<b>Dominant Wavelength</b>	582	nm
<b>Peak Wavelength</b>	594	nm

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



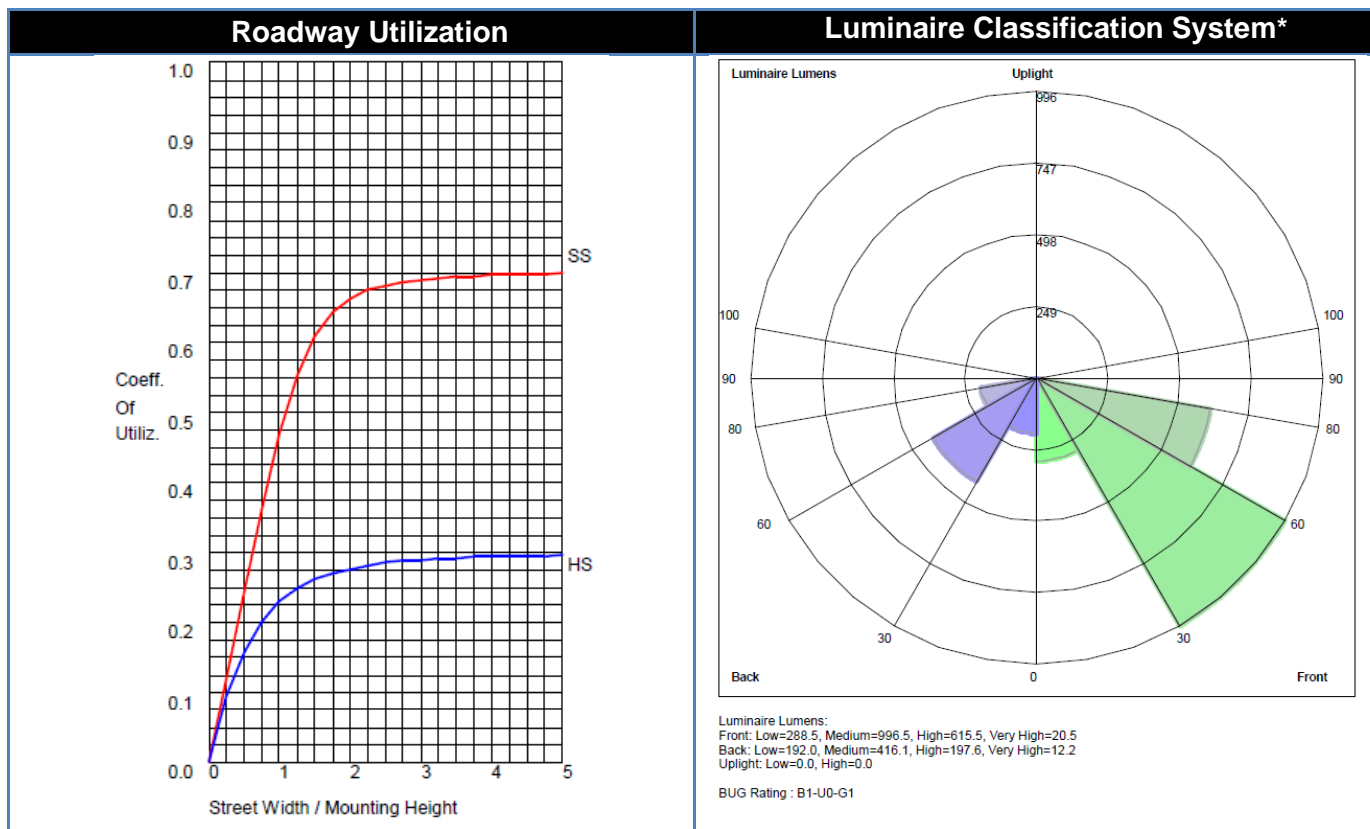
**Zonal Lumen Summary**

Zone	Lumens	% of Total	Zone	Lumens
0-20	230.5	8.4	0-10	62.1
0-30	480.6	17.5	10-20	168.4
0-40	824.5	30.1	20-30	250.0
0-60	1893.2	69.1	30-40	344.0
0-80	2706.3	98.8	40-50	467.4
0-90	2739.0	100.0	50-60	601.3
10-90	2676.9	97.7	60-70	574.5
20-40	594.0	21.7	70-80	238.6
20-50	1061.4	38.7	80-90	32.8
40-70	1643.1	60.0	90-100	0.0
60-80	813.1	29.7	100-110	0.0
70-80	238.6	8.7	110-120	0.0
80-90	32.8	1.2	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>2739.0 LM</b>	<b>100%</b>		



Roadway Summary	Lumens	% Lamp
Distribution	TYPE III SHORT	
Downward Street Side	1921.0	70.1
Downward House Side	818.0	29.9
Downward Total	2739.0	100.0
Upward Street Side	0.0	0.0
Upward House Side	0.0	0.0
Upward Total	0.0	0.0
Total Lumens	2739.0	100

Luminaire Classification System (LCS)	Lumens	% Luminaire
FL - Front Low (0-30)	288.5	10.5
FM - Front Medium (30-60)	996.5	36.4
FH - Front High (60-80)	615.5	22.5
FVH - Front Very High (80-90)	20.5	0.7
BL - Back Low (0-30)	192.0	7.0
BM - Back Medium (30-60)	416.1	15.2
BH - Back High (60-80)	197.6	7.2
BVH - Back Very High (80-90)	12.2	0.4
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	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7
1	673.0	676.2	676.7	676.5	676.7	676.3	676.4	676.4	675.7	676.5	676.7	677.7	677.1	676.9	676.9
2	678.4	681.0	681.5	681.2	681.4	681.0	680.8	680.5	679.5	680.2	679.9	680.6	679.8	679.1	678.7
3	683.0	685.1	685.7	685.3	685.2	684.6	684.3	684.0	682.7	683.2	682.6	683.1	681.9	680.9	680.1
4	687.0	689.1	689.5	689.1	688.9	688.2	687.7	687.1	685.8	685.9	685.2	685.4	683.8	682.6	681.6
5	691.0	692.5	693.0	692.5	692.4	691.5	690.9	690.2	688.8	688.5	687.8	687.5	685.7	684.3	682.9
6	694.3	695.5	696.0	695.7	695.6	694.7	693.9	693.1	691.6	691.4	690.1	689.9	687.8	685.9	684.1
7	697.5	698.5	699.0	698.6	698.4	697.5	696.7	695.8	694.3	694.0	692.6	691.9	689.5	687.2	684.6
8	700.3	701.1	701.4	701.1	700.6	700.0	699.3	698.7	697.2	696.5	694.8	693.8	690.8	688.0	685.0
9	702.6	702.8	703.1	702.9	702.7	702.3	701.7	701.3	699.9	699.1	696.9	695.2	691.8	688.5	685.1
10	703.9	703.8	704.0	704.1	704.2	704.0	704.1	703.7	702.1	701.1	698.6	696.5	692.5	688.5	684.3
11	704.4	704.3	704.6	704.8	705.3	705.6	706.0	705.5	704.0	703.1	700.2	697.5	692.7	688.1	682.7
12	704.5	704.1	704.8	705.1	706.0	707.0	707.2	707.0	705.6	704.5	701.4	698.6	692.9	687.1	680.9
13	704.0	703.2	704.2	705.2	706.6	707.7	708.4	708.4	706.9	705.7	702.4	699.2	693.0	686.1	679.1
14	702.9	701.8	703.1	704.6	706.8	708.1	709.0	709.4	707.7	706.5	703.0	699.0	692.2	684.6	676.1
15	700.9	699.8	701.4	703.6	705.9	708.1	709.6	710.1	708.3	707.0	703.2	698.6	690.6	682.2	672.4
16	698.6	698.1	699.8	702.3	705.3	707.9	709.7	710.7	709.2	707.4	703.0	697.9	689.1	679.6	668.8
17	696.8	696.7	698.5	701.3	704.9	707.6	709.6	710.9	709.7	707.7	702.8	697.3	687.8	677.3	665.5
18	695.5	695.6	697.7	700.8	704.8	707.7	709.8	710.8	709.8	707.9	702.6	696.1	685.8	674.5	661.5
19	694.2	694.2	696.8	700.3	704.6	707.9	710.1	711.2	709.8	707.8	702.4	695.2	684.0	671.5	657.2
20	692.6	692.9	695.6	699.6	704.6	708.2	710.8	711.8	710.4	708.3	702.4	694.8	683.0	669.0	654.0
21	691.3	691.7	694.9	699.4	704.8	708.8	711.7	712.9	711.3	708.9	702.7	694.5	682.1	667.2	651.2
22	690.5	691.2	694.7	700.1	705.9	709.9	712.8	714.0	712.5	709.8	703.3	694.4	681.1	665.5	647.6
23	690.0	691.2	695.4	701.5	707.7	712.1	715.1	715.9	714.5	711.8	705.0	695.6	681.0	664.4	644.7
24	690.3	692.3	696.8	703.7	710.6	715.5	718.2	718.7	717.4	714.6	707.8	697.8	682.8	664.5	643.5
25	691.3	693.7	698.8	706.6	714.2	719.5	722.1	722.8	721.0	718.0	711.4	701.2	685.1	665.4	642.9
26	693.3	695.8	701.1	709.4	717.8	723.9	727.0	727.7	725.9	722.6	716.0	705.3	687.7	666.4	641.9
27	695.5	698.4	704.1	712.6	721.6	728.1	732.0	733.4	731.6	728.2	721.4	710.3	691.1	667.9	642.0
28	697.8	701.2	707.4	716.5	725.8	732.1	737.4	739.6	738.1	734.7	727.6	715.5	695.7	670.5	642.9
29	700.6	704.4	710.6	720.4	730.4	736.7	742.2	745.7	745.0	742.1	734.0	721.4	700.2	673.6	644.1
30	704.0	708.0	714.4	724.2	734.3	741.1	747.4	752.0	752.9	751.0	742.0	727.5	705.3	677.0	645.5
31	707.6	712.0	718.9	728.4	738.7	745.6	752.8	758.4	761.3	760.1	751.0	734.6	711.6	681.1	647.5
32	711.3	716.3	723.1	733.4	743.7	750.3	758.1	764.9	769.4	769.2	760.3	742.7	718.1	686.2	650.3
33	716.0	721.0	728.0	739.0	749.2	756.1	764.2	772.0	777.8	779.2	770.4	751.7	725.0	691.8	653.5
34	720.8	726.2	733.6	745.3	755.6	762.5	771.2	779.5	787.2	790.0	781.5	762.2	733.2	698.4	657.9
35	726.4	731.6	739.9	752.0	762.9	769.9	779.3	788.4	797.0	800.2	792.5	772.9	742.3	705.7	663.3
36	732.0	737.9	746.4	759.2	770.7	778.4	788.1	797.6	806.8	810.9	803.8	784.7	752.1	714.0	669.5

**Candela Tabulations (Continued)**

	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
0	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7	672.7
1	676.8	676.3	677.1	679.2	675.9	674.0	673.5	672.6	671.4	670.4	670.1	668.2	667.4	665.6	665.4
2	678.1	677.0	677.5	678.9	675.1	672.6	671.4	669.8	668.2	666.4	665.3	662.6	661.1	658.9	657.6
3	679.1	677.6	677.5	678.6	674.2	671.0	669.0	666.8	664.3	661.8	659.8	656.1	653.5	650.4	647.9
4	680.3	678.3	677.7	678.4	673.2	669.3	666.5	663.4	660.0	656.4	653.2	648.3	644.0	639.6	636.0
5	681.2	678.7	677.5	677.6	671.7	667.3	663.9	659.8	655.5	650.3	645.0	638.8	633.1	627.4	622.2
6	681.6	679.0	677.1	676.5	670.1	664.9	660.5	655.3	649.5	642.8	635.8	627.5	620.1	612.1	605.4
7	681.8	678.5	676.2	675.1	668.2	662.0	656.7	650.0	642.3	633.9	624.9	614.6	604.7	594.7	586.5
8	681.6	677.9	675.0	673.3	665.8	658.9	652.4	644.0	634.2	623.8	612.5	600.2	588.5	576.7	567.9
9	681.1	676.5	673.2	671.1	662.8	655.3	647.5	637.0	625.5	613.4	599.6	585.3	572.0	559.9	550.9
10	679.8	674.7	670.9	667.9	658.9	650.4	641.2	629.3	615.5	601.1	585.4	569.6	555.8	544.1	535.5
11	677.3	671.6	667.2	663.2	653.7	644.2	633.4	619.9	604.0	587.3	570.1	553.9	540.6	529.1	520.8
12	674.5	667.5	662.5	657.8	647.1	636.8	624.8	609.2	591.5	573.2	555.1	539.3	526.5	515.5	507.1
13	671.6	663.7	657.6	652.1	639.8	629.1	615.6	598.1	578.5	558.9	541.2	525.5	513.0	502.7	494.0
14	667.3	658.8	651.4	645.0	632.1	620.3	604.9	586.1	565.1	544.4	527.5	512.2	500.0	489.6	479.9
15	662.2	652.5	644.1	636.8	623.0	610.0	593.3	573.2	551.1	530.0	513.4	498.9	487.0	476.0	465.7
16	657.5	646.3	636.6	628.6	613.7	599.6	582.1	560.5	537.7	517.0	500.7	486.0	473.6	462.4	451.7
17	652.9	640.6	629.6	620.7	604.8	590.2	571.5	548.5	525.6	504.8	488.7	473.2	460.3	448.7	438.0
18	647.4	633.9	621.9	611.6	595.4	579.6	559.5	536.2	512.9	492.1	475.8	460.2	446.6	434.9	424.2
19	641.6	626.6	613.5	602.5	585.9	568.8	547.5	523.5	500.1	480.1	463.2	447.3	433.5	421.9	411.1
20	637.0	620.3	605.9	594.5	577.0	558.8	536.9	511.9	488.5	469.1	451.6	435.6	422.0	409.2	398.8
21	632.7	614.5	599.4	586.6	568.6	549.6	526.6	500.8	477.2	458.2	440.9	424.6	410.9	397.5	386.8
22	627.6	608.3	592.2	577.8	559.6	539.8	515.3	489.4	465.9	447.0	430.0	414.3	400.2	386.4	375.3
23	623.6	602.6	585.1	570.0	550.9	530.2	505.3	478.9	455.7	437.5	420.4	404.6	390.2	375.9	364.7
24	621.0	598.6	579.5	563.8	543.4	522.2	496.8	470.2	447.3	429.2	412.2	395.8	380.9	366.6	355.2
25	618.9	595.3	574.9	557.7	536.6	515.0	488.7	462.4	439.8	421.6	404.7	387.6	371.9	357.6	346.9
26	616.5	591.6	569.3	551.4	529.5	507.5	480.8	455.1	432.9	414.3	397.3	379.7	363.2	349.2	339.5
27	614.9	588.6	565.1	545.9	523.2	501.0	474.3	448.6	426.6	408.1	390.6	372.2	355.2	341.8	332.9
28	614.5	586.4	561.5	541.5	518.1	495.5	468.6	443.0	421.5	402.5	384.3	365.0	348.2	335.3	327.3
29	613.8	584.3	557.8	537.1	513.5	490.0	463.1	437.7	416.6	397.2	378.0	358.1	341.8	329.6	322.6
30	613.5	582.1	554.4	532.5	508.8	484.6	457.8	432.9	411.7	392.1	371.7	351.6	335.8	324.9	319.2
31	613.7	580.8	551.9	529.3	504.8	479.9	453.5	428.3	407.5	387.5	365.8	345.7	330.7	321.5	317.5
32	614.6	580.3	550.1	526.8	501.5	476.2	449.4	424.5	403.8	383.0	360.4	340.3	326.7	319.3	316.7
33	616.3	580.4	548.8	524.5	499.0	472.6	445.6	421.3	400.8	378.7	355.4	335.8	324.2	318.5	317.0
34	618.7	581.2	548.7	523.6	496.9	469.5	442.5	419.2	398.1	374.7	351.1	332.5	323.1	318.8	318.3
35	621.7	583.1	549.5	523.5	495.8	467.4	440.3	417.7	395.7	371.0	347.4	330.8	323.0	319.7	320.1
36	625.8	586.1	551.3	524.7	495.7	466.0	438.9	417.1	394.0	368.2	344.9	330.2	323.9	321.3	322.4

**Candela Tabulations (Continued)**

	150	155	160	165	170	175	180
0	672.7	672.7	672.7	672.7	672.7	672.7	672.7
1	664.9	664.2	663.5	663.0	662.8	662.3	657.7
2	656.8	655.5	654.4	653.7	652.6	652.5	646.4
3	646.0	643.8	641.9	640.8	639.2	638.8	630.7
4	633.1	629.8	626.9	625.2	622.3	621.3	612.3
5	617.7	613.3	609.4	606.5	602.5	600.9	589.6
6	599.6	593.5	588.8	585.1	581.0	578.8	568.1
7	579.4	572.7	567.7	563.9	560.4	558.1	547.9
8	560.3	553.8	548.8	545.1	542.2	539.7	530.9
9	543.2	536.9	532.6	528.8	526.3	523.8	515.6
10	528.2	521.8	517.6	514.0	511.8	509.1	500.9
11	513.8	507.6	503.2	499.3	497.1	494.3	486.1
12	500.2	493.5	488.7	484.5	482.2	479.9	470.7
13	486.6	479.7	474.6	470.0	467.6	465.0	456.5
14	472.4	465.0	459.6	455.3	452.2	450.5	442.0
15	457.8	450.0	444.3	439.9	436.5	435.3	427.0
16	443.6	435.7	429.5	425.0	421.2	419.8	411.2
17	429.8	421.8	415.2	410.5	406.0	404.0	395.7
18	415.9	407.4	400.1	395.9	390.9	388.5	380.8
19	402.1	393.7	385.9	381.5	376.3	373.6	365.9
20	389.3	380.6	372.8	367.6	362.3	359.3	352.3
21	377.1	368.5	360.8	355.1	350.3	347.2	341.4
22	365.3	357.2	349.7	344.0	340.0	337.1	332.2
23	354.7	347.2	340.1	334.9	331.5	329.0	324.9
24	346.0	338.4	332.3	327.6	325.0	322.8	319.6
25	338.3	331.5	326.2	322.2	319.9	318.1	315.6
26	331.6	325.7	321.3	318.1	316.0	314.6	312.9
27	326.1	321.4	318.0	315.3	313.4	312.4	311.4
28	322.0	318.3	316.0	313.9	312.0	310.9	310.6
29	318.9	316.6	315.2	313.7	312.0	310.7	311.2
30	317.0	315.9	315.9	315.0	313.3	311.7	312.3
31	316.2	316.7	317.8	317.7	316.0	313.9	315.0
32	316.9	318.7	320.8	321.3	319.7	317.2	318.5
33	318.6	321.8	325.1	325.9	323.8	320.7	321.5
34	321.4	325.9	329.7	330.3	327.2	323.3	323.4
35	324.3	329.7	333.5	333.3	329.2	324.6	323.9
36	327.4	332.9	335.9	334.7	329.7	324.7	322.8

**Candela Tabulations (Continued)**

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
37	739.2	745.6	754.2	766.8	779.1	787.3	798.1	808.6	818.6	822.9	815.9	797.5	763.2	722.7	676.5
38	747.9	754.7	762.8	776.1	789.1	797.6	809.2	820.7	831.4	835.7	828.8	810.5	775.5	732.6	685.0
39	757.2	764.1	771.8	785.9	800.2	809.3	821.1	832.9	843.6	847.7	841.2	822.6	787.7	742.6	693.5
40	767.0	774.2	781.1	795.0	811.1	821.8	833.2	845.7	855.9	860.4	853.7	835.3	800.2	753.5	702.7
41	777.5	785.4	790.2	803.8	821.7	833.8	846.9	859.4	869.3	873.6	867.2	848.9	813.5	765.4	713.5
42	790.4	797.9	800.6	813.5	833.1	846.6	861.0	873.3	882.7	887.4	881.4	862.5	827.7	778.5	725.1
43	802.4	810.4	811.5	824.1	844.9	859.9	875.0	888.1	896.8	900.8	895.4	876.4	841.3	791.2	736.4
44	814.7	823.0	823.2	835.5	857.7	873.9	890.1	902.7	912.3	917.5	912.1	891.5	856.1	805.8	749.3
45	826.9	835.2	835.5	848.1	871.3	889.8	906.6	922.0	929.8	933.2	929.6	909.5	873.2	821.9	764.5
46	838.4	846.0	847.3	860.9	885.9	906.8	927.3	938.9	946.0	948.5	945.6	928.4	891.0	839.1	780.0
47	847.1	852.9	857.0	871.8	899.4	926.1	946.1	958.2	963.7	965.0	962.4	947.2	910.5	857.3	796.5
48	852.3	855.9	862.5	879.3	911.9	942.1	965.8	978.1	983.2	983.6	980.5	968.4	933.7	878.6	817.9
49	852.7	853.8	862.7	883.2	920.7	957.4	984.9	1000.1	1005.7	1005.4	1001.9	991.8	959.5	904.6	843.5
50	848.1	845.9	857.3	881.4	923.8	967.5	1002.0	1022.1	1029.3	1028.2	1025.2	1017.0	986.9	934.1	869.1
51	838.5	832.5	846.3	875.0	921.5	972.3	1015.5	1042.4	1053.3	1053.0	1052.3	1047.5	1018.9	966.3	901.8
52	822.1	814.0	830.2	863.3	914.3	972.1	1023.4	1059.5	1078.1	1082.2	1085.6	1085.2	1061.4	1007.7	942.9
53	800.4	789.4	807.2	844.8	901.3	965.2	1025.1	1072.4	1102.1	1114.0	1124.6	1128.4	1110.9	1055.6	986.5
54	771.4	758.1	779.3	820.8	880.3	950.9	1019.7	1077.4	1121.7	1144.3	1166.4	1177.8	1164.4	1110.2	1033.3
55	735.5	722.3	745.9	791.5	852.9	928.3	1005.7	1074.4	1136.5	1174.3	1212.3	1238.0	1230.8	1176.4	1089.6
56	695.6	682.0	707.5	754.7	819.1	898.2	982.5	1063.2	1142.8	1201.0	1261.3	1306.2	1309.1	1254.6	1153.8
57	651.9	637.6	664.4	710.4	776.7	856.8	950.2	1043.6	1140.2	1221.8	1308.4	1375.8	1389.0	1335.0	1219.0
58	606.9	593.6	619.0	663.4	728.8	813.9	909.2	1016.0	1128.6	1234.5	1351.3	1446.9	1474.0	1417.3	1284.8
59	560.8	547.4	571.1	612.2	677.2	765.7	863.3	979.6	1107.4	1238.9	1390.7	1521.1	1564.4	1505.0	1356.3
60	512.7	495.3	518.6	556.4	620.6	712.6	811.6	932.8	1075.5	1231.1	1418.4	1584.0	1646.9	1586.8	1421.6
61	463.8	440.0	461.4	498.0	561.8	656.0	755.5	880.7	1034.9	1212.4	1433.0	1634.3	1714.4	1651.4	1474.2
62	408.3	384.2	403.4	441.3	499.6	594.4	695.5	818.7	985.7	1182.5	1434.6	1671.6	1769.6	1701.4	1516.9
63	348.9	328.2	346.9	380.7	436.8	525.9	627.1	752.0	923.6	1138.8	1420.6	1692.6	1805.6	1732.4	1541.2
64	297.3	280.2	296.9	324.7	374.5	456.3	555.6	679.7	856.8	1083.9	1386.5	1690.4	1815.1	1737.1	1540.3
65	255.7	242.7	256.3	280.0	321.5	392.4	486.1	608.7	783.7	1019.5	1338.2	1663.1	1794.1	1711.8	1517.1
66	222.7	212.7	223.3	243.4	278.8	338.0	421.3	536.2	710.4	945.6	1272.2	1607.4	1738.0	1655.5	1467.0
67	195.9	188.3	196.0	211.7	242.1	291.8	361.9	468.6	634.6	867.6	1192.3	1523.4	1652.7	1572.3	1399.2
68	174.3	167.9	173.6	186.0	211.3	252.2	311.7	406.7	565.3	785.9	1101.9	1425.6	1552.2	1476.2	1317.0
69	155.5	151.3	156.2	165.1	185.3	219.2	270.9	353.7	497.1	702.3	1000.4	1308.3	1432.1	1361.4	1214.5
70	141.6	138.0	141.5	148.6	163.9	191.1	235.1	306.4	432.1	615.8	890.0	1184.7	1308.4	1238.3	1105.1
71	130.7	126.9	129.7	135.0	147.3	168.7	204.4	264.3	369.2	529.4	776.6	1063.0	1187.7	1119.4	1000.7
72	120.6	116.7	119.4	124.1	134.3	151.1	179.0	227.1	315.3	448.7	667.3	938.8	1063.2	1005.4	892.7
73	110.7	106.6	109.6	114.1	123.4	137.4	158.6	194.7	268.8	377.3	562.1	802.9	933.8	891.9	784.5

**Candela Tabulations (Continued)**

	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
37	631.2	590.1	555.0	527.5	497.0	465.9	439.1	417.7	392.9	366.4	343.8	330.6	325.3	323.5	324.9
38	637.7	595.6	559.8	532.0	500.1	467.1	440.4	419.1	392.4	365.5	343.7	332.2	327.2	325.9	327.5
39	644.7	601.9	565.3	536.9	504.1	469.3	442.2	420.9	392.1	365.1	344.3	333.4	328.5	328.0	329.8
40	653.3	609.4	572.8	543.5	509.4	472.5	445.2	423.2	393.0	366.6	346.5	335.3	330.1	330.1	331.5
41	663.5	619.0	582.6	553.1	517.3	477.6	449.8	427.2	395.6	370.0	349.5	337.0	331.6	331.9	332.5
42	674.2	629.6	592.5	563.9	526.9	483.7	454.5	432.1	398.7	374.0	352.3	338.4	333.1	333.2	333.2
43	684.8	640.6	603.1	574.5	536.7	490.3	459.8	436.5	402.9	378.3	354.9	339.6	334.9	334.9	334.3
44	697.9	653.0	617.1	588.7	548.0	498.0	467.3	442.3	408.8	384.5	358.0	341.0	336.8	337.5	336.1
45	713.3	668.1	632.6	605.5	561.4	506.6	475.6	449.2	415.5	390.7	360.7	343.6	339.7	340.9	336.6
46	727.5	683.1	646.3	620.3	574.3	515.8	483.4	455.8	421.5	395.0	362.7	346.1	343.4	343.0	332.4
47	743.6	698.0	660.8	634.5	586.6	525.3	491.2	462.2	428.0	398.5	365.0	349.4	347.1	340.7	323.4
48	764.5	716.5	678.1	650.4	599.3	535.3	500.5	469.2	434.5	401.9	367.8	353.7	347.4	333.6	310.7
49	788.0	736.9	695.2	665.7	611.6	545.1	508.8	476.3	440.4	404.7	370.3	354.8	342.5	321.5	295.0
50	810.5	757.1	712.2	679.2	622.2	554.0	515.9	481.7	444.7	405.9	371.4	352.4	332.6	307.5	281.2
51	837.4	779.3	731.9	693.9	632.5	562.3	522.9	486.8	447.9	406.1	370.4	345.6	319.6	293.6	268.9
52	871.2	808.0	754.9	712.2	644.8	570.4	528.6	491.2	449.6	403.8	363.6	331.8	305.5	281.7	259.9
53	908.7	839.4	778.4	729.7	657.5	578.3	532.2	493.7	448.2	397.5	351.7	317.5	293.0	273.6	254.8
54	948.8	871.7	804.2	747.4	668.6	584.7	533.9	491.3	443.3	387.3	338.1	302.9	283.6	268.3	251.6
55	997.4	913.7	836.9	768.8	680.2	589.5	531.9	486.1	436.3	375.9	323.9	291.7	277.2	265.2	250.1
56	1051.3	963.0	872.4	792.1	692.8	592.0	528.2	480.0	428.2	364.5	312.0	284.3	272.5	262.7	249.4
57	1103.1	1008.7	907.3	813.5	703.9	593.0	523.6	472.9	418.9	353.8	303.1	279.0	268.1	259.9	248.7
58	1158.5	1054.8	946.8	835.8	712.8	590.9	516.5	464.5	408.8	343.5	295.5	274.3	264.7	256.5	247.0
59	1217.7	1104.7	984.1	857.7	720.0	584.1	503.3	452.2	396.9	332.9	288.4	269.2	260.8	253.5	244.5
60	1268.8	1150.2	1016.0	872.7	723.0	570.9	483.2	435.7	383.3	322.1	281.3	263.7	256.6	249.8	241.1
61	1311.2	1185.4	1040.6	882.9	722.1	553.9	456.8	414.1	366.8	311.0	274.2	258.6	252.1	245.9	237.0
62	1345.4	1216.1	1061.0	887.5	716.1	531.7	423.4	385.4	344.6	297.3	266.3	253.0	247.2	241.0	232.3
63	1366.3	1237.4	1072.9	883.9	703.4	504.9	390.2	352.5	318.5	280.9	257.1	246.5	241.0	235.6	226.7
64	1366.5	1241.2	1072.9	872.1	684.0	476.1	361.0	324.4	293.0	263.1	246.8	239.8	234.9	229.1	220.3
65	1347.4	1229.3	1059.0	849.8	657.2	442.6	334.2	300.2	269.5	245.0	235.4	231.8	227.9	222.7	213.3
66	1307.1	1196.0	1027.1	816.5	619.7	402.7	305.7	275.6	248.7	228.6	222.7	222.1	219.8	214.7	205.8
67	1247.8	1140.6	979.8	772.6	574.3	362.4	279.6	252.3	231.7	215.7	210.7	212.5	210.5	205.7	198.2
68	1172.8	1072.4	916.7	719.2	526.5	323.8	251.3	229.2	214.4	202.7	199.7	202.7	200.6	196.8	190.8
69	1079.4	984.2	835.9	653.4	474.8	287.1	222.0	204.5	195.0	189.2	187.9	191.2	189.0	186.0	182.0
70	979.4	886.2	749.3	586.1	425.3	255.2	197.3	183.7	178.0	176.7	176.5	178.7	175.9	173.1	171.3
71	882.0	791.5	668.4	523.1	379.2	228.4	176.8	166.0	163.9	165.5	165.8	167.4	162.8	160.3	157.8
72	783.4	701.6	586.7	460.9	336.3	203.8	156.5	149.1	150.5	153.7	154.8	155.6	149.9	148.3	144.8
73	689.4	613.9	510.0	403.5	296.6	179.9	138.2	133.6	137.4	142.1	144.0	144.2	138.4	135.9	131.6

**Candela Tabulations (Continued)**

	150	155	160	165	170	175	180
37	330.1	335.0	336.9	334.6	329.2	323.9	321.0
38	331.7	335.5	336.3	333.0	327.5	322.3	318.6
39	332.9	335.1	334.6	330.3	324.8	319.5	315.1
40	333.4	333.9	331.5	326.6	320.7	315.4	310.2
41	333.1	331.9	327.6	321.5	314.9	309.8	304.0
42	332.7	329.6	322.4	314.2	307.2	301.7	293.7
43	332.3	325.9	314.2	304.3	296.2	289.9	279.6
44	330.6	317.9	302.5	291.8	281.8	274.8	263.5
45	323.7	305.7	288.1	276.3	265.4	258.9	248.8
46	312.4	291.6	272.9	260.3	251.4	245.7	238.7
47	299.2	276.7	258.3	247.9	241.8	237.7	233.7
48	284.3	262.3	246.9	239.5	236.1	233.4	231.1
49	270.2	251.3	239.1	234.5	232.6	230.5	228.6
50	258.9	243.4	235.0	231.3	229.4	227.2	224.5
51	250.5	238.7	232.1	228.4	225.7	223.3	220.4
52	244.3	235.8	229.5	225.4	221.9	219.2	216.6
53	240.3	233.5	227.1	222.5	218.3	215.6	213.0
54	238.1	231.2	224.9	220.3	215.2	212.3	209.2
55	236.9	229.2	222.7	218.2	212.4	209.2	205.6
56	235.8	227.1	220.7	215.7	209.6	206.0	202.3
57	234.5	224.7	217.9	212.9	206.7	202.8	199.3
58	232.8	222.0	214.3	209.5	203.5	199.9	197.3
59	230.2	218.8	210.0	205.3	200.3	197.5	195.5
60	226.8	214.8	205.8	200.6	196.8	195.2	193.6
61	222.7	210.4	201.9	196.8	193.4	192.3	192.2
62	218.1	205.9	198.2	193.9	190.7	189.3	188.4
63	213.3	201.5	194.6	190.8	187.9	185.3	180.1
64	208.1	197.2	190.5	186.7	182.9	178.8	170.3
65	202.7	192.1	185.0	180.5	176.0	170.2	162.4
66	197.1	186.1	177.5	173.2	167.6	161.4	155.3
67	190.7	178.9	167.6	166.0	158.8	153.8	148.3
68	183.4	170.1	159.5	157.9	149.7	145.8	140.0
69	173.6	160.2	151.4	147.3	139.9	135.8	127.4
70	162.4	150.3	141.6	136.9	129.3	123.3	112.9
71	149.7	140.0	131.6	126.5	117.8	110.6	101.2
72	136.6	128.1	121.6	114.5	106.3	99.6	92.6
73	124.5	117.5	110.3	103.1	96.4	91.0	84.5

**Candela Tabulations (Continued)**

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
74	100.7	95.9	99.8	103.6	113.0	125.9	142.2	167.3	226.7	314.0	463.5	675.3	807.0	782.9	688.5
75	90.3	85.0	88.8	93.0	102.8	116.2	128.7	145.8	190.0	258.9	382.2	559.5	688.4	678.6	597.4
76	78.9	74.0	77.3	81.8	91.8	105.6	117.0	128.0	158.3	214.4	315.8	459.4	570.8	575.4	505.1
77	67.8	63.5	65.8	70.4	79.7	93.6	105.3	112.7	131.5	178.6	263.6	378.5	466.9	476.2	421.1
78	57.4	53.6	55.8	59.5	67.5	80.7	92.9	99.7	110.7	149.9	219.6	311.5	374.7	388.0	345.0
79	48.6	44.7	46.7	49.9	56.6	68.1	80.2	87.8	94.4	124.8	181.3	250.8	294.9	306.5	273.3
80	40.2	36.6	38.1	40.7	45.9	55.7	67.3	75.5	80.6	103.5	147.6	198.3	233.8	237.2	211.3
81	32.5	29.2	30.6	32.3	36.3	43.6	53.6	62.9	68.3	82.8	116.8	154.5	181.6	179.9	163.4
82	26.0	22.8	23.9	25.2	28.1	33.5	42.3	50.8	55.2	64.1	89.3	117.0	134.6	133.1	122.0
83	20.1	17.3	18.2	19.1	21.1	24.8	31.6	38.2	43.3	48.9	65.7	83.4	94.2	91.3	86.7
84	15.2	12.8	13.4	14.0	15.4	18.0	22.2	27.5	31.8	35.6	45.8	56.6	62.3	60.1	57.9
85	11.2	9.3	9.8	10.1	11.0	12.6	15.3	19.2	21.9	24.6	30.2	35.2	38.3	37.3	35.6
86	8.1	6.7	6.9	7.2	7.8	8.8	10.4	12.5	14.0	15.7	18.8	20.9	23.1	22.4	21.6
87	5.8	4.8	5.0	5.1	5.6	6.2	7.1	8.1	9.1	9.5	11.1	12.6	13.7	13.1	12.2
88	4.2	3.6	3.7	3.8	4.1	4.5	4.9	5.2	5.7	5.9	6.5	7.2	7.8	7.2	6.8
89	3.0	2.7	2.9	3.0	3.2	3.5	3.8	3.9	4.0	4.1	4.1	4.5	4.8	4.6	4.3
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)**

	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
74	602.8	535.0	445.1	353.1	261.3	159.2	123.1	119.9	125.2	131.2	133.1	133.1	127.1	123.4	118.9
75	522.3	463.6	385.3	307.6	228.3	140.0	109.0	107.1	113.2	120.0	122.4	121.6	115.6	110.3	105.8
76	444.7	395.3	328.7	266.1	196.3	121.5	95.0	94.3	100.5	107.9	110.5	109.7	103.6	96.5	93.2
77	370.6	331.4	279.3	227.3	167.1	105.1	82.6	82.0	88.7	96.2	98.7	97.2	90.4	82.8	79.3
78	306.1	276.8	236.5	191.7	140.8	89.6	71.0	70.3	77.1	84.2	87.2	85.2	77.0	70.7	67.5
79	245.3	226.7	195.7	159.2	116.9	74.8	60.2	59.7	65.5	72.4	76.0	73.0	65.2	60.3	57.3
80	192.7	181.3	157.9	130.6	94.7	62.2	50.5	50.2	54.7	61.5	64.9	61.8	55.6	50.9	48.4
81	148.4	142.1	125.5	105.1	76.1	51.3	42.2	41.8	45.5	50.8	54.3	51.9	46.6	43.0	41.1
82	112.5	108.7	96.4	81.5	60.0	41.2	34.8	34.2	37.2	41.7	45.0	42.8	38.8	35.8	34.5
83	81.4	78.8	70.9	61.7	45.6	32.5	28.3	28.0	29.9	33.5	36.2	34.8	31.8	29.2	28.4
84	55.2	54.9	50.1	43.7	33.7	25.1	22.3	22.3	23.9	26.5	28.9	27.9	25.5	23.8	22.9
85	35.3	35.6	32.8	29.6	24.2	18.4	17.0	17.4	18.8	20.7	22.5	21.9	20.4	19.2	18.1
86	21.7	22.3	20.9	19.0	16.3	13.2	12.6	13.3	14.4	16.0	17.2	17.0	16.0	15.3	14.3
87	12.3	12.9	12.5	11.5	10.6	9.2	9.1	10.1	10.9	11.9	12.6	12.7	12.3	12.0	11.2
88	6.9	7.3	7.0	6.5	6.7	6.5	6.8	7.3	8.2	8.8	9.1	9.2	9.1	9.1	8.6
89	4.4	4.2	4.0	3.8	4.1	4.4	5.1	5.7	6.1	6.4	6.6	6.7	6.7	6.9	6.5
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	112.5	108.4	99.7	92.4	89.0	83.1	76.3
75	102.8	99.3	89.8	83.6	81.1	75.2	68.8
76	91.1	89.6	79.9	75.2	73.7	67.8	61.9
77	78.8	78.4	70.0	66.8	65.7	60.6	55.4
78	67.4	67.6	60.6	58.6	57.5	53.8	49.1
79	58.0	57.2	52.0	50.6	50.3	47.2	43.0
80	49.2	48.3	44.4	43.5	42.9	41.0	37.2
81	40.8	40.0	37.6	37.2	36.7	35.2	31.7
82	34.0	32.8	31.5	31.5	30.8	29.7	26.8
83	27.7	26.8	25.9	25.9	25.3	24.7	22.0
84	22.3	21.5	20.9	20.8	20.5	20.0	17.7
85	17.6	17.3	16.8	16.4	16.1	15.6	13.4
86	13.6	13.5	13.3	12.7	12.4	11.7	9.7
87	10.5	10.2	10.4	9.9	9.3	8.1	6.4
88	7.8	7.3	7.5	7.3	6.7	5.4	3.9
89	6.1	5.3	5.2	5.0	4.5	3.6	2.2
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	02-01-2024
Type C Goniophotometer	02-01-2024

## 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.

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

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**Exceptions:**

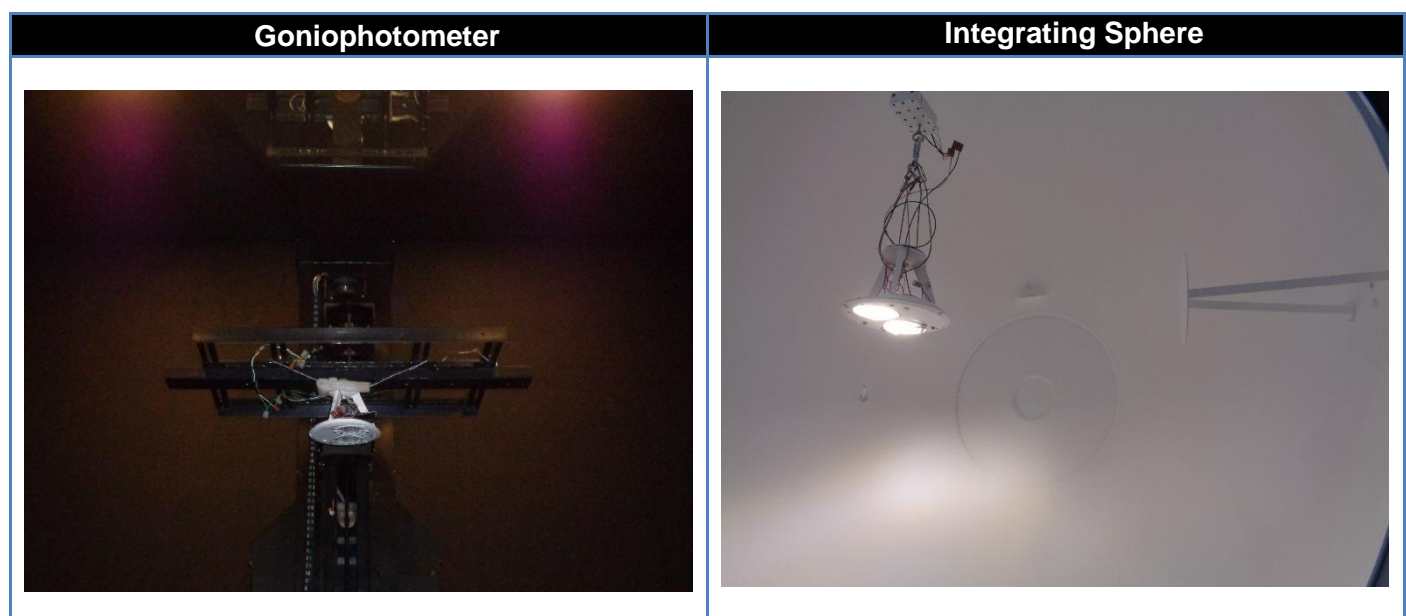
Data in this report tested under Non-Standard Conditions (i.e. temperature outside the allowed acceptance interval for the equipment/test) are identified with (~).

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
02/02/2024	A	DMS	Origination	J. Rocco	M. Hubbard

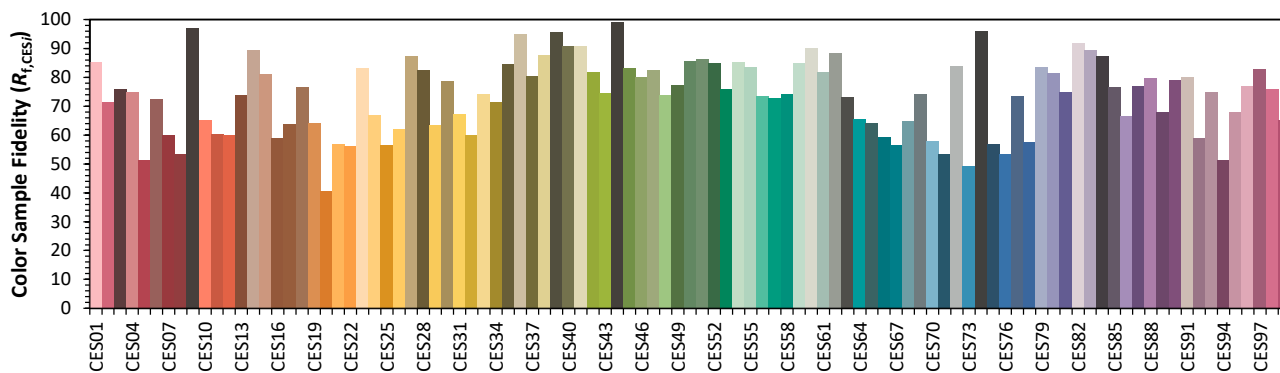
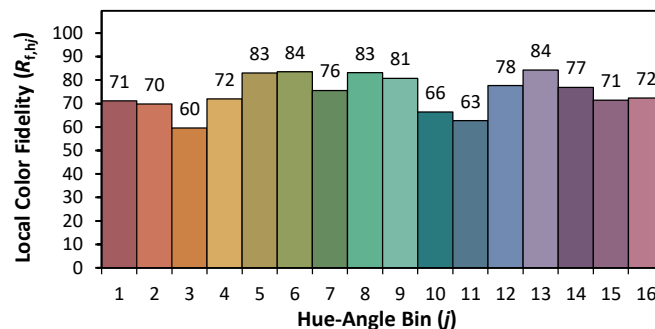
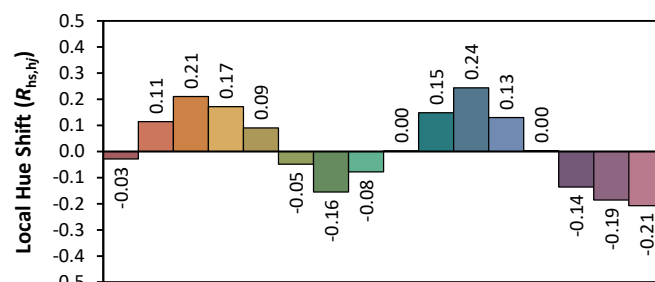
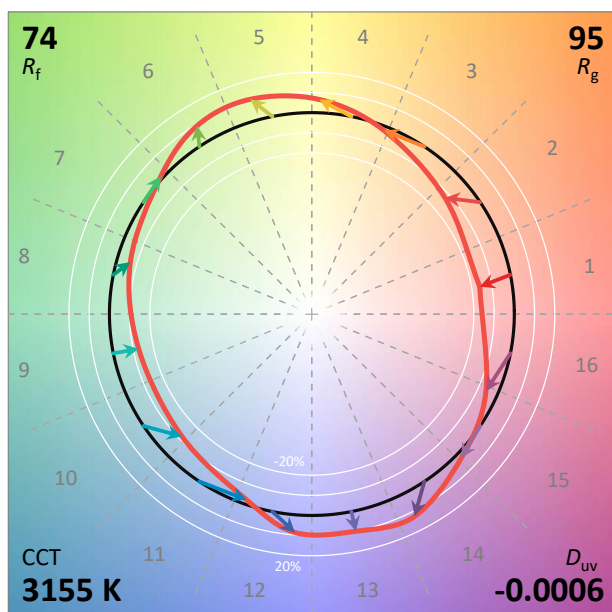
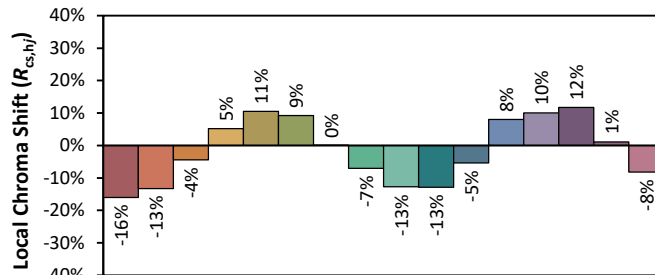
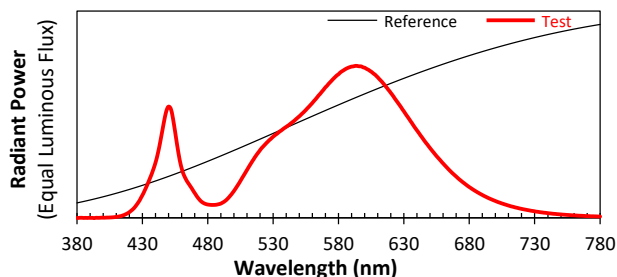
## ANSI/IES TM-30-18 Color Rendition Report

Source: OSQP-C-3L-30K7-3R-UL (Light Engine)

Manufacturer: Cree Lighting

Date: 2/2/2024

Test: PL18135-001



Notes:

x 0.4255

y 0.3984

u' 0.2456

v' 0.5174

CIE 13.3-1995  
(CRI)

R<sub>a</sub> 72

R<sub>g</sub> -30