

Report Number: PL18122-001A
Model: OSQP-C-3L-40K7-3R-UL (Light Engine)
Issue Date: 01/30/2024

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

Prepared For:

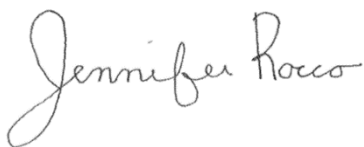
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Cree Lighting

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Product Information

Manufacturer	Cree Lighting
Model Number (SKU)	OSQP-C-3L-40K7-3R-UL (Light Engine)
Serial Number	18122
LED Type	SSC STW7C12C-E0

Product Description

OSQP-C Pathway Luminaire (Light Engine), 3L Lumen Package, 4000K 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	2882.9	2846.0	lm
Efficacy	146.39	144.10	lm/W
Correlated Color Temperature (CCT)	4141	K	
Color Rendering Index (CRI)	72		
R ₉	-39		
Duv	-0.0002		
TM-30 R _f *	74		
TM-30 R _g *	93		
TM-30 R _{cs,h1} *	-18.3%		
S/P Ratio*	1.57		

Electrical Measurements	Sphere		Goniophotometer		
	120V	277V	120V	277V	
Input Wattage	19.69	19.94	19.75	19.89	W
Input Current	0.169	0.075	0.169	0.075	A
Input Voltage	120.09	277.44	120.08	277.22	V
Power Factor	0.969	0.956	0.972	0.956	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.05	0.21	0.23	0.09	%
Total Harmonic Distortion (Amperage)	12.71	10.30	11.88	10.71	%

Note: All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Max Candela	1741.685	Cd
Angle of Max Candela (Horizontal)	60	°
Angle of Max Candela (Vertical)	64	°

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	54	34	min
Total Operating Time (Stabilization + Test)	64	54	min
Ambient Temperature	24.79	24.8	°C

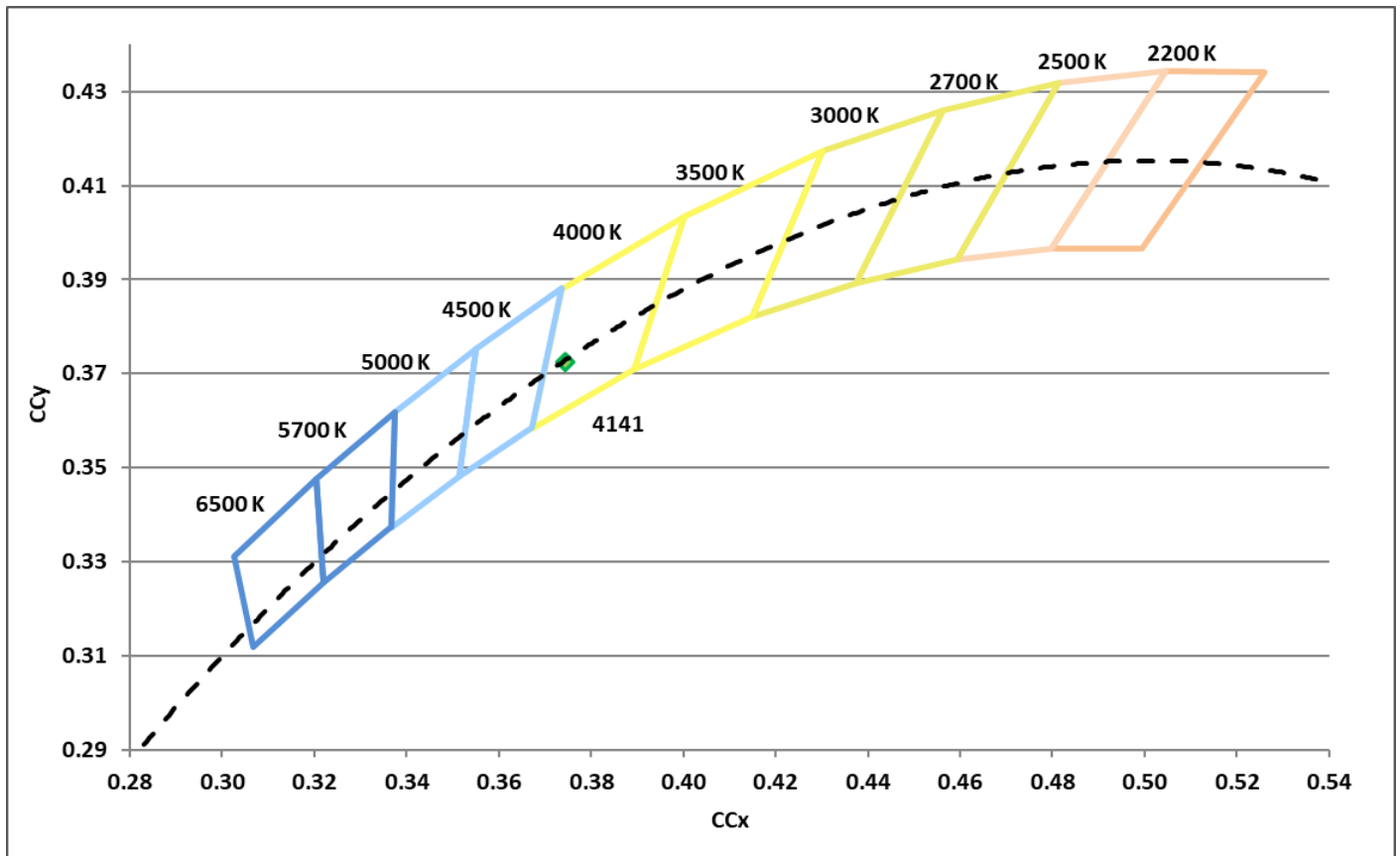
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3743	0.3725	0.2228	0.3325	0.2228	0.4988	-0.0002

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
72	68	79	88	70	68	71	80	49	-39	51	66	43	70	93

Chromaticity Diagram



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

Spectral Distribution

λ (nm)	W/nm
360	0.000069
370	0.000097
380	0.000006
390	0.000032
400	0.000098
410	0.000514
420	0.002913
430	0.012180
440	0.035484
450	0.067978
460	0.027512
470	0.012954
480	0.007965
490	0.009388
500	0.016443
510	0.024828
520	0.031286

λ (nm)	W/nm
530	0.035338
540	0.038570
550	0.042311
560	0.046583
570	0.050739
580	0.052908
590	0.052555
600	0.049294
610	0.043829
620	0.037180
630	0.030368
640	0.024041
650	0.018567
660	0.014104
670	0.010466
680	0.007690
690	0.005643

λ (nm)	W/nm
700	0.004131
710	0.003007
720	0.002194
730	0.001584
740	0.001141
750	0.000824
760	0.000604
770	0.000440
780	0.000317
790	0.000223
800	0.000164
810	0.000117
820	0.000058
830	0.000054

Dominant Wavelength

578

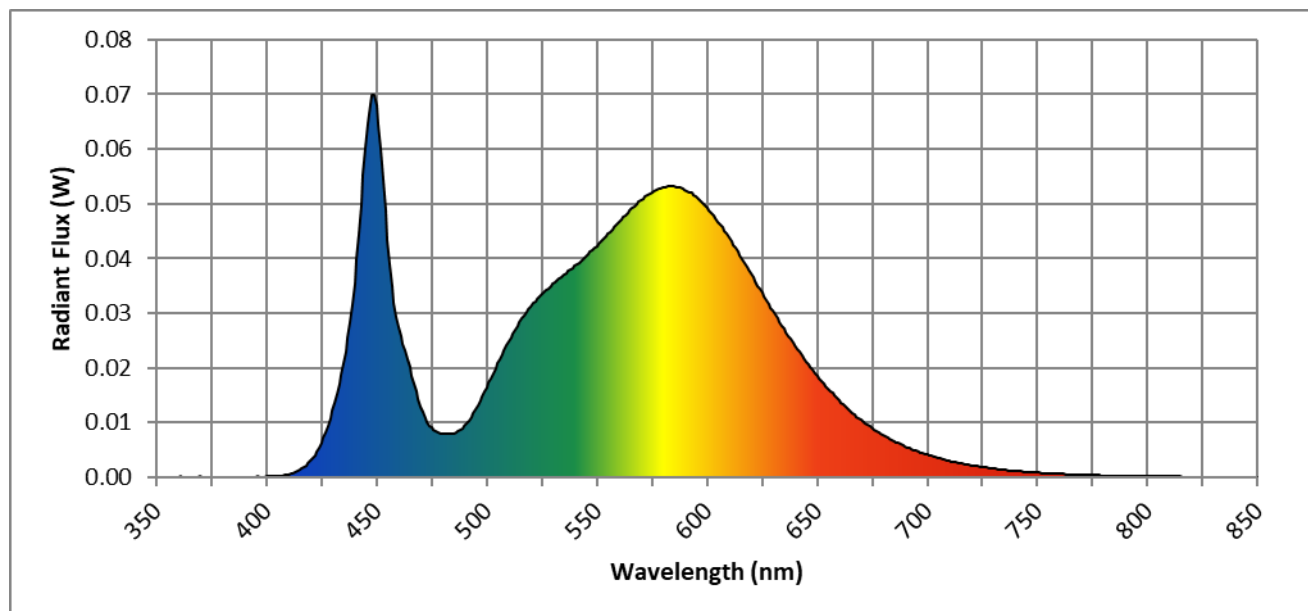
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Peak Wavelength

448

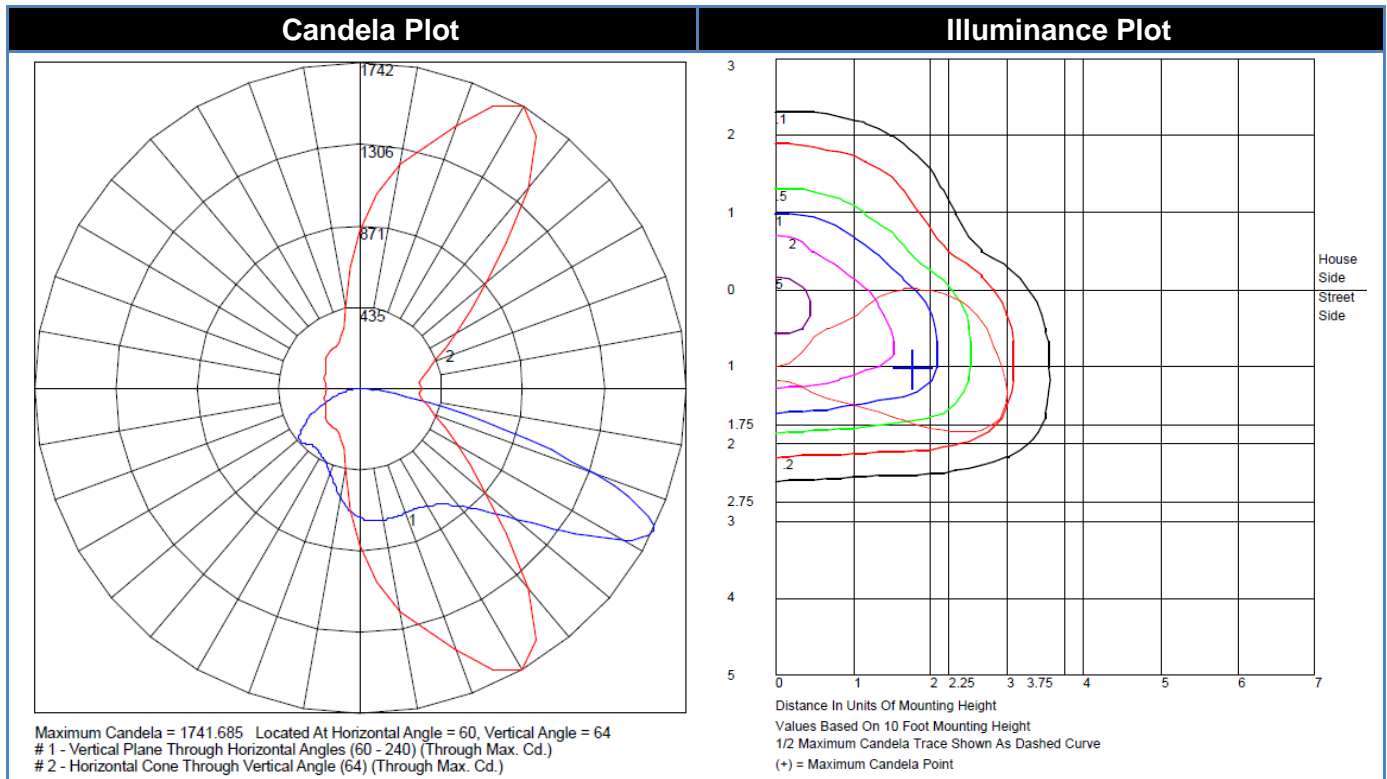
nm

Spectral Power Distribution (W/nm)



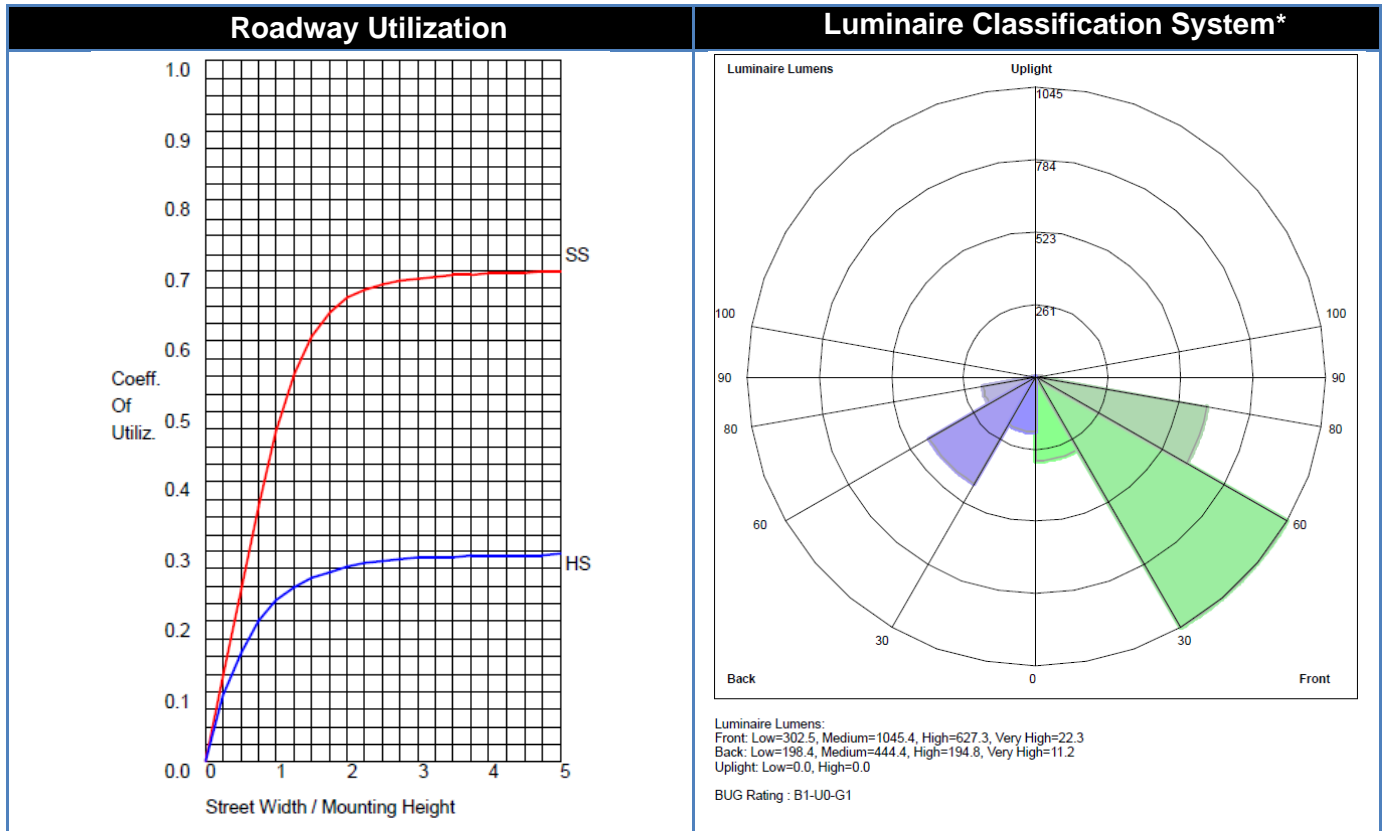
Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens
0-20	237.4	8.3	0-10	63.6
0-30	500.9	17.6	10-20	173.8
0-40	867.7	30.5	20-30	263.5
0-60	1990.7	69.9	30-40	366.8
0-80	2812.9	98.8	40-50	496.5
0-90	2846.3	100.0	50-60	626.5
10-90	2782.8	97.8	60-70	578.8
20-40	630.3	22.1	70-80	243.4
20-50	1126.8	39.6	80-90	33.5
40-70	1701.8	59.8	90-100	0.0
60-80	822.2	28.9	100-110	0.0
70-80	243.4	8.6	110-120	0.0
80-90	33.5	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		
Total	2846.3 LM	100%		



Roadway Summary	Lumens	% Lamp
Distribution	TYPE III SHORT	
Downward Street Side	1997.5	70.2
Downward House Side	848.8	29.8
Downward Total	2846.3	100.0
Upward Street Side	0.0	0.0
Upward House Side	0.0	0.0
Upward Total	0.0	0.0
Total Lumens	2846.3	100.0

Luminaire Classification System (LCS)	Lumens	% Luminaire
FL - Front Low (0-30)	302.5	10.6
FM - Front Medium (30-60)	1045.4	36.7
FH - Front High (60-80)	627.3	22.0
FVH - Front Very High (80-90)	22.3	0.8
BL - Back Low (0-30)	198.4	7.0
BM - Back Medium (30-60)	444.4	15.6
BH - Back High (60-80)	194.8	6.8
BVH - Back Very High (80-90)	11.2	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	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5
1	692.9	697.7	697.7	697.6	698.7	698.5	698.3	698.5	698.2	697.8	697.1	697.5	697.5	697.5	696.8
2	701.5	705.0	704.8	704.8	705.8	705.3	704.7	704.8	704.2	703.4	702.3	701.8	701.6	700.7	699.4
3	707.9	711.3	711.0	711.1	711.6	711.0	710.3	710.0	709.0	707.8	706.3	705.5	704.9	703.5	701.7
4	714.0	716.9	716.7	716.7	716.9	716.2	715.1	714.6	713.4	711.7	709.9	708.7	707.5	705.8	703.2
5	719.4	721.9	721.4	721.4	721.3	720.8	719.5	718.7	717.5	715.4	713.3	711.7	709.8	707.5	704.4
6	724.0	726.4	726.0	726.0	725.8	725.0	723.5	722.5	721.1	718.8	716.3	714.3	711.9	709.1	705.4
7	728.6	730.9	730.4	730.5	730.1	729.3	727.6	726.0	724.4	721.6	718.9	716.5	713.5	710.1	706.0
8	733.1	735.3	734.6	734.6	734.2	733.0	731.3	729.6	727.6	724.3	720.8	718.0	714.6	710.8	705.9
9	737.2	738.7	738.1	737.9	737.7	736.4	734.5	732.4	730.2	726.6	722.5	719.0	715.3	710.9	705.4
10	739.6	741.1	740.5	740.3	740.2	739.1	737.3	735.0	732.3	728.6	724.2	720.3	715.8	710.8	704.6
11	741.6	743.1	742.4	742.1	742.1	740.9	739.2	737.1	734.4	730.4	725.8	721.3	716.1	710.2	703.4
12	743.5	744.8	744.0	743.8	743.8	742.6	740.8	738.8	735.9	731.9	726.9	721.7	716.0	709.4	701.5
13	744.9	746.0	745.2	745.1	745.4	744.2	742.4	740.3	737.3	733.2	727.9	722.2	715.8	708.3	699.5
14	745.8	746.6	746.1	745.9	746.6	745.8	744.2	741.8	738.6	734.1	728.6	722.5	715.2	707.0	697.3
15	745.9	746.3	745.9	745.9	747.2	746.8	745.4	743.2	739.7	734.8	729.1	722.5	714.6	705.7	694.9
16	744.9	745.7	745.4	745.8	747.2	747.3	746.4	744.2	740.8	735.5	729.4	722.3	713.7	703.9	692.1
17	744.3	745.4	745.2	745.8	747.3	747.5	747.0	745.2	741.8	736.4	729.6	722.2	712.9	702.2	689.5
18	744.0	745.2	745.1	746.1	747.4	747.8	747.2	745.7	742.8	737.3	730.0	722.0	712.1	700.4	686.7
19	743.8	744.9	745.3	746.3	748.2	748.7	747.8	746.4	743.5	738.1	730.6	721.8	711.0	698.6	683.9
20	743.5	744.6	745.3	746.7	748.8	749.6	748.9	747.4	744.3	739.3	731.6	721.5	710.1	696.7	681.2
21	743.1	744.5	745.3	746.9	749.6	750.9	750.4	748.8	745.7	740.3	732.1	721.5	709.5	695.2	678.5
22	743.6	745.1	746.1	747.7	750.5	752.0	752.2	750.7	747.7	741.5	733.1	721.9	709.2	693.8	675.9
23	744.5	746.6	747.5	749.5	752.0	753.6	754.1	753.4	749.9	743.6	734.8	723.2	709.1	692.8	673.7
24	746.5	748.8	749.9	751.7	754.7	756.1	756.6	756.2	752.9	746.6	737.2	725.1	709.9	692.6	671.9
25	748.4	751.0	752.3	754.4	757.7	759.6	760.2	759.6	756.4	750.0	740.2	728.0	711.3	692.7	670.7
26	750.8	753.3	754.9	757.2	761.0	763.4	764.7	763.9	760.3	753.8	744.1	731.0	713.1	693.1	669.8
27	753.1	755.9	757.7	760.2	764.3	767.6	769.3	769.5	765.4	758.6	748.6	735.0	716.1	694.3	669.4
28	755.9	759.3	760.9	763.3	768.1	771.9	774.2	775.2	771.3	764.1	753.6	739.5	719.5	696.4	669.6
29	759.3	763.3	764.7	767.0	772.3	776.8	779.5	781.1	777.7	770.1	758.9	744.5	723.5	698.5	670.5
30	763.4	767.8	768.9	771.5	777.0	781.9	785.4	787.6	785.0	777.1	765.3	749.7	727.9	701.6	672.1
31	768.2	773.1	773.9	776.6	782.3	788.0	791.8	794.8	792.9	785.2	772.5	755.8	733.3	705.7	674.3
32	773.5	778.5	779.0	781.9	787.8	794.3	799.1	802.5	801.6	793.9	780.8	762.5	739.2	710.4	677.5
33	779.3	784.5	784.3	787.6	794.0	801.1	806.7	810.6	810.7	803.2	790.1	769.9	746.0	716.0	681.5
34	785.6	790.9	790.2	793.6	800.8	808.4	814.9	819.7	820.7	813.3	800.2	778.8	753.3	722.6	686.4
35	792.5	797.6	796.4	800.5	808.4	816.9	824.1	829.9	831.8	825.0	811.2	789.4	761.7	730.7	692.5
36	799.3	804.6	802.9	807.4	816.5	825.9	833.8	840.3	843.3	837.0	823.6	800.8	771.5	739.3	699.7

Candela Tabulations (Continued)

	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
0	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5	691.5
1	696.6	695.4	697.3	699.2	695.6	691.9	691.4	690.0	689.0	687.3	686.1	684.2	683.6	682.8	681.6
2	698.5	696.5	697.6	698.6	694.0	689.4	688.0	685.7	683.7	680.9	678.8	675.8	674.2	672.9	670.3
3	700.1	697.2	697.6	697.6	692.1	686.6	684.2	680.6	677.5	673.6	670.4	666.0	663.1	660.8	656.7
4	701.1	697.5	697.0	696.2	689.7	683.3	679.7	674.8	670.6	665.0	660.4	654.6	649.6	646.4	640.9
5	701.7	697.5	696.2	694.7	687.2	679.6	675.0	668.7	663.0	655.7	648.9	642.0	635.0	630.4	623.9
6	701.9	697.2	695.3	692.8	684.3	675.6	669.9	662.0	654.2	645.7	636.5	628.1	619.7	614.1	606.9
7	701.8	696.3	693.7	690.3	680.8	671.2	663.9	654.4	644.6	634.3	623.2	613.6	604.0	597.1	589.3
8	701.2	695.0	691.6	687.2	676.9	666.2	657.0	645.9	634.2	622.4	609.8	598.8	588.1	579.6	571.7
9	699.9	693.1	688.6	683.7	672.5	660.5	649.9	636.9	623.8	610.2	596.2	583.7	572.1	562.7	554.8
10	698.4	690.7	685.4	679.5	667.6	654.4	642.3	627.6	612.5	597.7	582.2	568.7	556.8	546.9	538.9
11	696.7	688.0	682.1	675.1	662.1	647.8	633.9	617.7	601.0	584.7	568.4	553.6	542.2	531.7	523.9
12	694.3	684.6	678.1	670.2	656.1	640.8	625.3	607.3	589.1	571.3	554.4	539.7	527.7	517.4	509.4
13	691.5	681.0	673.5	665.0	650.0	633.4	616.4	596.9	577.3	557.9	541.3	525.9	514.4	504.0	495.9
14	688.2	677.1	668.5	659.4	643.4	625.4	607.0	586.2	565.2	545.1	528.2	513.2	501.6	491.8	483.1
15	684.6	672.6	663.4	653.6	636.3	617.3	597.6	575.3	553.1	532.8	516.0	501.3	489.7	479.7	470.3
16	680.6	667.8	657.9	647.0	628.7	609.0	587.8	564.1	541.1	521.0	504.3	490.0	477.9	467.8	457.6
17	676.9	663.1	652.2	640.5	621.1	600.3	577.8	553.0	530.2	509.9	493.5	479.4	466.5	456.3	445.9
18	672.8	658.2	646.2	633.5	613.4	591.1	567.5	541.9	519.5	499.5	483.2	469.0	455.8	445.5	434.9
19	668.8	653.0	640.0	626.4	605.6	581.7	557.0	531.2	509.0	489.1	472.7	458.6	445.4	434.8	424.1
20	664.7	647.9	633.8	619.1	597.5	572.2	547.0	521.4	499.0	479.5	462.9	448.7	435.4	424.7	413.4
21	661.1	642.8	627.8	612.1	589.3	563.1	537.4	512.1	489.6	470.3	453.4	439.1	426.0	414.8	403.2
22	657.5	637.8	621.6	604.8	581.2	553.9	528.3	503.1	480.6	461.6	444.6	430.2	417.2	405.3	393.3
23	653.9	632.9	615.5	597.8	573.3	545.5	519.6	494.5	472.1	453.3	436.4	421.9	408.7	396.1	384.1
24	650.9	628.4	610.1	591.3	565.6	537.7	511.9	486.9	464.5	445.9	429.1	414.3	400.4	387.3	375.9
25	648.6	624.7	605.3	585.2	558.7	530.9	505.0	479.8	457.8	439.3	422.9	407.4	392.8	379.3	368.8
26	646.4	621.0	600.5	579.5	552.4	524.7	498.6	473.4	451.8	433.4	417.3	400.7	385.6	372.6	363.0
27	644.4	617.8	595.7	574.2	546.7	518.7	492.7	467.5	446.4	428.2	411.8	394.0	378.8	366.7	358.2
28	643.0	615.4	591.7	569.9	541.8	513.3	487.4	462.7	442.0	423.8	406.5	387.8	372.7	361.7	354.2
29	642.4	613.5	588.7	565.9	537.6	508.7	482.9	458.2	437.8	419.9	401.1	382.0	367.5	357.6	351.5
30	642.4	611.9	586.1	562.8	534.0	505.0	478.8	454.4	434.5	416.0	395.6	376.7	363.0	354.6	350.3
31	643.1	611.2	584.1	560.5	531.1	501.8	475.5	451.4	431.5	412.0	390.3	372.0	359.6	352.8	350.4
32	645.0	611.7	583.6	559.3	529.2	499.2	472.8	449.4	429.1	408.2	385.7	368.4	357.2	352.2	352.0
33	647.3	612.9	583.8	558.9	528.2	497.5	470.8	447.9	427.2	404.7	381.9	365.4	356.0	352.9	354.6
34	650.7	614.8	585.1	559.6	527.8	496.3	469.6	446.7	425.8	401.4	378.9	363.3	355.8	354.7	357.6
35	655.4	618.2	587.6	561.5	528.6	496.2	469.2	446.9	424.7	398.8	376.9	362.4	356.9	357.1	360.8
36	661.0	622.8	591.1	564.4	530.4	497.1	469.9	447.9	423.9	397.1	375.9	362.7	358.9	359.4	364.3

Candela Tabulations (Continued)

	150	155	160	165	170	175	180
0	691.5	691.5	691.5	691.5	691.5	691.5	691.5
1	680.8	679.6	679.3	677.3	677.0	676.9	669.8
2	668.9	667.0	665.9	663.9	662.9	662.5	654.2
3	654.8	651.7	649.4	647.3	645.5	644.8	635.3
4	637.4	633.7	630.1	628.7	625.9	624.6	615.3
5	619.3	614.7	610.7	608.3	605.3	604.0	594.6
6	600.6	595.4	590.8	588.2	584.5	582.8	574.6
7	582.0	576.4	571.2	568.4	564.5	562.4	554.9
8	563.5	558.0	552.6	549.5	545.5	543.2	536.2
9	546.3	540.7	535.5	531.8	528.3	526.3	519.6
10	530.3	524.6	520.0	515.6	513.1	510.9	504.4
11	515.5	510.0	505.3	500.4	498.1	496.0	489.1
12	501.6	495.6	490.8	485.8	483.7	481.3	473.7
13	488.4	481.7	477.1	471.7	469.6	467.3	459.4
14	475.1	468.3	463.5	458.4	456.0	453.8	445.8
15	462.3	455.3	450.1	445.2	442.5	440.3	432.6
16	449.9	442.4	437.1	431.9	429.0	427.1	420.3
17	438.0	430.5	424.6	419.5	416.1	414.3	407.8
18	426.5	418.6	412.5	407.4	403.7	401.6	395.9
19	415.0	407.0	400.0	395.3	391.1	389.1	384.2
20	403.4	395.4	388.4	383.7	379.4	377.7	373.4
21	392.7	384.6	377.7	373.1	369.6	367.9	364.6
22	382.5	374.9	368.7	364.5	361.7	360.2	357.5
23	373.4	366.5	361.3	357.4	355.4	354.5	352.5
24	365.9	359.8	355.5	352.2	351.0	350.4	349.0
25	360.2	354.6	351.2	348.7	348.0	347.7	346.7
26	355.7	351.0	348.3	346.7	346.4	346.2	345.7
27	352.1	348.4	346.9	346.1	346.0	346.1	345.8
28	349.8	347.5	346.8	346.5	346.8	347.1	347.2
29	348.8	347.9	348.1	348.1	348.6	349.3	350.7
30	349.1	349.7	350.5	351.2	352.4	353.1	354.7
31	350.9	352.6	354.6	355.6	357.1	357.8	359.0
32	353.9	356.8	359.5	360.8	362.2	362.5	363.0
33	357.8	361.5	365.0	366.3	366.8	366.5	365.7
34	362.2	366.6	370.4	370.9	370.3	369.3	367.8
35	367.1	371.9	374.6	374.1	372.1	370.7	368.6
36	371.6	375.6	376.8	375.3	372.4	370.2	367.0

Candela Tabulations (Continued)

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
37	806.6	812.2	809.8	814.6	824.8	835.4	844.4	851.3	855.4	850.1	836.4	812.9	782.3	748.3	707.8
38	814.6	820.4	817.8	822.5	833.5	845.6	855.6	863.5	868.6	863.8	850.8	827.3	794.8	758.7	717.0
39	823.0	828.8	826.4	830.9	842.9	855.6	866.9	876.5	883.6	879.9	865.7	842.1	808.8	770.2	727.2
40	831.4	837.2	834.8	839.3	851.9	865.6	879.7	889.7	896.9	894.9	882.3	857.4	823.4	782.3	738.4
41	840.3	846.1	843.8	848.2	860.8	876.1	890.6	902.0	910.0	910.2	898.6	876.1	839.5	795.6	751.2
42	849.5	855.2	852.9	857.6	870.7	887.9	901.8	914.9	924.4	926.5	917.1	895.4	857.6	812.1	766.2
43	857.5	863.8	861.8	867.0	880.2	897.6	912.9	926.8	938.4	943.0	936.8	915.6	880.1	831.1	783.8
44	865.0	871.5	870.5	876.1	890.8	907.0	923.7	938.6	953.1	961.3	957.2	937.4	901.6	853.6	801.9
45	871.2	877.9	878.5	885.2	900.0	917.1	934.8	952.6	968.4	978.7	980.8	961.4	925.2	876.8	822.5
46	876.1	882.6	885.8	892.8	908.6	927.1	948.3	966.1	984.0	997.6	1005.1	990.6	954.2	905.2	848.6
47	878.4	884.5	890.6	898.7	916.3	936.6	960.4	979.7	999.6	1016.5	1028.4	1017.5	983.6	934.8	875.4
48	878.3	883.3	892.2	902.6	922.2	946.8	971.5	993.6	1015.9	1036.7	1052.0	1046.6	1016.8	965.1	902.4
49	875.4	879.0	890.0	903.7	926.5	954.6	982.7	1007.7	1033.7	1058.6	1078.4	1079.2	1053.5	1000.8	935.5
50	868.3	870.4	883.7	901.4	928.5	960.7	992.8	1021.4	1051.1	1080.7	1106.0	1114.0	1094.0	1042.5	971.9
51	858.1	858.2	873.6	895.5	927.1	964.3	1000.6	1033.2	1067.2	1102.6	1132.5	1148.6	1133.4	1081.4	1005.9
52	844.1	842.1	859.5	885.8	922.1	964.4	1005.4	1043.4	1082.5	1125.1	1161.5	1185.9	1176.4	1123.8	1045.8
53	827.1	822.2	841.0	871.7	912.2	959.9	1006.5	1049.7	1097.7	1147.9	1195.5	1229.5	1228.1	1173.8	1093.5
54	805.5	798.8	818.8	852.8	897.8	950.4	1001.6	1052.2	1108.5	1168.8	1229.0	1273.3	1278.1	1224.3	1138.6
55	778.2	770.5	791.4	828.8	876.4	933.1	991.7	1049.4	1115.4	1186.7	1261.2	1317.6	1327.3	1274.7	1182.2
56	743.0	733.8	756.0	796.0	847.8	909.0	975.7	1040.8	1117.6	1203.2	1296.6	1369.0	1388.2	1334.8	1234.2
57	701.9	692.3	715.4	755.3	811.8	878.1	951.8	1025.6	1113.2	1216.1	1331.6	1421.9	1451.5	1398.8	1289.0
58	657.2	647.2	671.7	711.6	770.3	839.5	920.9	1005.5	1103.9	1223.9	1360.8	1469.8	1505.6	1455.9	1332.5
59	610.3	598.4	626.2	662.8	722.7	794.7	880.7	977.7	1088.0	1225.8	1387.0	1517.2	1564.4	1513.6	1379.9
60	561.1	546.3	574.1	611.4	669.9	746.0	831.3	940.7	1063.2	1221.0	1410.1	1567.6	1625.2	1573.6	1426.8
61	505.1	489.7	518.1	556.0	612.7	692.9	777.6	895.6	1033.9	1208.0	1423.0	1605.4	1670.6	1616.7	1457.6
62	446.8	432.8	457.4	496.6	553.2	636.8	723.8	845.6	996.9	1186.9	1425.8	1631.7	1706.0	1644.7	1477.1
63	389.2	372.5	395.4	434.7	488.7	570.6	662.5	787.8	945.8	1152.9	1417.9	1648.2	1734.8	1665.8	1492.6
64	334.1	318.6	339.1	374.3	425.5	501.6	598.5	720.5	882.6	1107.5	1395.6	1648.5	1741.7	1666.4	1489.9
65	286.5	274.6	290.4	323.6	366.2	436.3	531.7	652.7	819.7	1054.0	1360.9	1632.0	1727.9	1647.8	1469.7
66	248.7	239.4	252.1	279.4	315.7	374.6	461.6	581.9	749.4	988.7	1307.0	1593.0	1689.3	1609.4	1432.5
67	217.7	209.7	220.1	241.3	271.5	320.9	397.0	507.9	677.4	908.1	1230.8	1526.6	1624.4	1547.7	1371.3
68	192.5	185.9	194.2	211.4	235.6	278.9	345.1	445.6	609.5	831.3	1147.9	1451.2	1549.4	1472.0	1302.6
69	172.5	167.5	173.8	187.4	208.0	243.5	301.3	390.7	542.6	752.0	1053.8	1354.3	1455.2	1381.0	1218.9
70	157.5	152.8	157.1	167.8	184.4	212.0	260.6	338.7	476.0	663.3	937.1	1228.6	1331.4	1258.6	1113.0
71	144.8	140.2	143.8	151.7	165.1	186.1	225.8	292.1	413.0	577.3	815.8	1098.0	1202.7	1136.9	1007.1
72	133.6	129.2	132.1	138.9	149.4	165.9	198.0	254.6	355.3	499.8	709.0	967.3	1073.9	1022.5	906.8
73	121.8	118.5	121.5	126.8	136.3	149.5	173.4	218.0	302.4	416.5	597.9	820.8	930.4	895.7	795.1

Candela Tabulations (Continued)

	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
37	667.2	628.2	595.8	568.5	533.2	498.8	471.5	449.6	423.5	396.1	375.8	363.8	361.0	362.0	368.2
38	675.1	635.1	602.1	574.4	537.7	501.7	474.5	452.0	423.9	396.3	376.8	366.5	362.9	365.0	372.2
39	684.4	644.1	610.0	581.8	544.1	506.0	478.4	455.5	425.0	397.6	379.2	369.6	365.2	368.3	375.4
40	695.5	653.9	619.3	591.2	551.7	511.5	483.1	459.2	426.6	399.8	381.7	372.2	367.3	371.3	376.9
41	707.3	665.1	630.7	601.6	560.5	517.6	488.8	463.0	429.2	402.6	384.7	374.5	369.7	373.6	376.0
42	721.6	679.3	644.7	614.5	571.0	525.5	495.5	468.5	433.0	407.1	388.3	376.8	372.8	374.6	373.3
43	738.0	695.4	660.7	629.5	583.1	534.3	502.8	474.1	437.9	412.2	391.7	378.9	375.1	374.1	368.9
44	755.8	712.0	677.5	645.6	595.5	543.1	510.2	479.1	443.0	416.9	394.3	380.7	375.9	371.9	363.6
45	774.9	731.9	696.5	662.8	608.6	553.0	518.2	484.8	449.0	421.6	396.6	382.7	375.0	368.5	356.1
46	797.7	754.7	717.9	682.6	623.4	563.8	526.3	491.6	455.2	425.9	399.3	384.4	372.9	363.2	344.8
47	822.9	777.3	739.1	701.6	638.0	573.2	533.7	496.2	460.1	428.5	401.1	384.3	369.6	355.1	332.1
48	849.6	801.1	759.9	719.5	650.6	581.4	539.6	499.5	463.2	429.3	400.6	381.7	364.7	343.8	319.1
49	878.3	829.8	783.3	738.3	663.7	590.1	544.7	503.4	465.7	428.1	397.6	376.9	356.0	330.6	305.5
50	910.0	859.0	807.1	757.3	677.0	597.6	548.6	506.1	466.6	424.8	392.8	369.4	343.8	316.8	293.4
51	941.4	883.8	828.5	773.3	687.2	602.1	550.9	506.1	464.5	419.8	387.2	359.4	328.8	304.6	284.3
52	973.8	912.8	852.1	788.2	695.8	606.6	551.9	505.1	460.6	414.6	379.1	343.5	314.2	296.8	277.5
53	1012.2	946.0	876.3	803.6	705.2	610.8	551.8	502.6	454.2	406.4	362.8	323.3	303.6	291.6	272.3
54	1052.8	974.1	899.2	816.7	711.5	611.4	549.0	497.7	445.9	394.2	342.4	311.4	298.6	287.1	269.6
55	1088.6	1004.5	919.4	827.6	714.8	609.9	545.5	489.9	436.6	378.3	329.8	305.5	295.5	282.7	268.3
56	1129.4	1042.5	945.1	841.0	719.2	609.8	538.6	479.2	424.2	364.2	321.2	300.9	292.2	279.5	267.2
57	1174.4	1078.7	972.0	855.0	725.3	606.2	527.4	467.1	410.0	353.1	313.9	297.0	288.1	276.9	265.7
58	1213.7	1106.7	994.1	865.5	726.5	597.1	513.3	453.9	396.9	342.5	307.0	293.4	284.3	274.6	263.3
59	1250.5	1140.3	1015.2	875.3	724.5	583.6	495.4	437.5	382.4	331.4	300.2	289.3	280.6	271.8	260.0
60	1288.2	1173.6	1036.9	881.2	720.7	561.5	467.7	413.0	364.1	319.2	293.0	283.4	276.4	267.8	255.7
61	1316.3	1194.9	1049.9	880.6	712.0	535.6	433.5	385.2	344.0	306.4	285.5	277.1	271.6	263.0	250.8
62	1334.2	1210.8	1056.9	874.3	699.1	508.0	398.3	355.1	322.0	292.3	278.6	271.2	266.2	257.3	245.5
63	1343.1	1221.8	1056.9	862.0	681.1	476.4	362.6	321.9	296.3	274.7	270.0	264.0	258.8	250.2	239.3
64	1336.9	1217.5	1045.6	840.6	655.2	444.1	332.5	295.4	272.9	257.6	259.2	256.1	250.1	242.4	231.2
65	1315.8	1199.9	1023.7	813.3	621.2	409.9	307.9	275.2	254.0	242.9	247.9	247.0	241.1	233.8	223.0
66	1279.4	1168.4	991.4	779.3	582.7	370.7	282.8	253.7	236.1	228.0	235.1	234.8	229.5	223.0	214.4
67	1226.7	1118.8	944.0	734.9	537.9	334.7	257.7	232.4	219.3	214.2	220.1	221.1	216.5	210.8	204.5
68	1159.4	1059.0	884.2	687.2	492.2	304.0	236.2	214.0	203.8	202.3	207.7	210.0	204.1	199.5	194.3
69	1079.6	980.1	814.5	633.2	446.2	275.3	215.0	196.2	188.3	189.6	195.8	198.1	192.0	188.2	185.0
70	984.9	881.9	734.4	571.7	400.4	246.6	193.6	176.7	171.9	176.0	181.4	184.0	178.5	175.6	173.5
71	885.0	792.1	657.7	511.2	357.1	222.1	174.1	160.6	158.5	163.8	168.3	169.9	163.8	163.5	159.8
72	789.3	709.3	586.7	457.9	320.0	199.9	156.8	146.9	146.4	152.5	156.5	156.1	149.4	150.6	145.3
73	694.6	617.5	513.2	401.9	283.0	176.0	139.1	131.6	133.3	140.0	143.1	142.1	135.1	135.4	129.0

Candela Tabulations (Continued)

	150	155	160	165	170	175	180
37	375.2	377.8	377.3	373.6	370.0	366.9	362.6
38	377.9	378.1	374.6	368.3	364.2	360.7	355.4
39	378.4	375.3	368.8	360.5	355.8	352.6	347.1
40	376.6	369.6	361.0	352.1	346.9	343.9	338.2
41	372.1	362.3	352.5	342.7	337.1	333.3	326.0
42	365.7	353.7	341.9	331.2	324.3	319.6	310.2
43	358.2	343.1	329.5	317.3	308.8	303.4	292.9
44	348.9	331.2	315.6	301.9	292.3	286.4	276.3
45	336.7	317.4	300.3	285.4	276.3	270.7	263.0
46	323.3	302.7	284.6	270.7	262.8	259.1	254.7
47	309.8	288.5	271.4	259.6	254.1	252.2	250.3
48	296.4	276.2	261.2	253.0	249.8	248.7	247.2
49	283.5	266.2	254.9	248.8	246.1	244.8	242.8
50	273.4	259.3	250.8	245.0	241.8	240.0	237.6
51	266.0	254.9	247.6	241.3	237.7	235.3	233.2
52	261.1	252.3	244.7	237.9	233.7	231.1	229.0
53	258.9	250.2	242.2	234.8	229.9	227.0	224.4
54	258.0	248.5	239.9	232.0	226.3	223.2	220.1
55	256.8	246.5	237.3	229.3	223.0	219.5	215.7
56	255.0	243.9	234.3	226.3	219.8	215.2	211.2
57	252.5	240.3	230.6	222.7	216.6	211.2	207.0
58	249.3	236.6	226.1	218.5	212.6	208.2	205.6
59	245.3	232.7	221.6	214.0	208.2	205.5	205.4
60	240.8	228.3	217.5	209.9	205.2	203.1	202.2
61	235.8	223.5	212.8	206.6	203.2	200.8	198.3
62	230.7	218.3	208.2	204.2	201.9	197.6	195.4
63	224.9	212.4	204.2	202.9	198.6	193.8	190.2
64	218.4	206.0	200.6	199.6	192.0	186.8	181.1
65	211.4	200.1	196.5	191.1	183.7	174.5	170.6
66	204.8	194.6	187.7	181.2	173.9	165.1	160.3
67	197.4	186.7	174.9	171.2	162.8	156.3	150.4
68	188.5	174.4	163.9	162.3	152.7	147.1	137.9
69	175.9	160.5	153.8	151.9	141.9	135.6	126.6
70	160.9	147.6	143.0	137.6	128.7	122.3	113.4
71	146.2	135.9	132.2	123.0	114.5	108.0	98.4
72	132.6	125.3	120.4	109.9	101.0	95.0	89.0
73	119.7	115.9	108.3	98.0	91.6	86.6	80.8

Candela Tabulations (Continued)

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
74	110.5	106.8	110.0	115.0	124.3	135.9	152.8	187.3	255.7	344.9	495.6	691.5	798.8	779.6	693.1
75	99.8	95.4	98.3	103.4	112.5	124.3	137.7	162.8	216.6	291.2	418.1	586.5	690.4	685.2	604.6
76	88.0	83.8	86.3	91.4	100.7	112.6	124.5	140.9	180.0	242.5	351.0	483.2	575.7	585.8	516.5
77	76.9	72.7	74.7	79.3	88.3	100.3	111.5	121.6	149.0	201.6	289.9	389.6	467.0	486.9	433.2
78	65.9	62.2	64.5	68.4	76.6	87.9	99.1	107.4	125.5	170.0	242.6	321.2	382.3	400.2	361.6
79	55.2	52.5	54.5	58.0	65.6	75.7	87.3	95.1	105.9	140.0	201.5	261.1	308.1	323.0	293.0
80	45.6	43.0	45.1	48.1	53.9	63.0	75.4	82.2	87.6	113.5	160.7	206.1	242.6	253.6	230.7
81	37.6	34.6	36.5	38.8	43.3	51.1	63.3	70.6	72.3	90.6	126.6	163.2	190.8	198.7	180.5
82	30.1	27.7	28.8	30.6	33.9	40.6	50.7	57.4	59.2	71.7	99.4	125.5	147.0	151.7	136.4
83	23.6	21.6	22.6	23.4	25.9	30.4	37.2	44.4	47.7	53.2	71.4	89.0	104.8	107.0	97.2
84	18.4	16.5	17.1	17.5	19.0	21.3	26.2	32.9	36.5	39.1	48.6	60.0	70.6	68.8	62.6
85	13.7	12.5	12.8	13.1	13.7	15.2	18.3	23.3	26.0	27.5	32.2	38.6	42.7	41.5	38.9
86	10.2	9.3	9.6	9.5	10.0	10.8	12.4	15.1	16.9	17.9	19.8	22.3	23.2	21.8	20.9
87	7.6	7.0	7.0	7.1	7.4	7.8	8.4	9.4	10.1	10.7	11.1	11.6	11.5	10.9	10.6
88	5.8	5.2	5.3	5.5	5.7	5.9	6.1	6.2	6.3	6.5	6.6	6.7	6.6	6.5	6.1
89	4.5	3.9	4.2	4.4	4.6	4.7	4.9	4.8	4.7	4.7	4.6	4.6	4.7	4.6	4.2
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	603.2	535.6	447.1	350.5	247.3	154.5	122.4	116.9	120.8	128.2	130.3	128.5	122.5	118.7	113.6
75	525.0	469.5	390.1	307.3	216.6	136.3	107.8	104.7	109.5	116.9	118.7	115.8	110.4	104.0	99.6
76	449.7	401.9	333.8	264.0	186.5	117.9	94.3	91.8	97.6	104.3	106.6	103.3	98.3	89.3	85.2
77	377.9	336.1	281.7	223.8	157.9	100.5	80.7	78.7	85.0	91.4	93.6	90.8	84.9	76.5	72.0
78	314.9	283.8	238.6	190.3	133.7	86.1	69.4	68.3	73.8	79.7	82.1	79.7	71.6	65.6	61.8
79	258.7	236.3	198.2	159.0	112.0	72.4	59.2	58.4	63.1	68.1	71.1	67.6	60.6	55.4	52.8
80	207.9	187.5	159.9	129.6	90.4	59.5	49.7	48.7	52.5	56.8	59.3	56.7	51.3	46.9	45.0
81	161.8	148.8	125.9	103.6	71.2	49.1	41.3	40.8	43.6	47.3	49.7	47.3	43.0	39.7	38.1
82	122.4	114.7	96.2	81.1	55.1	39.2	33.8	33.5	35.3	38.8	41.1	39.1	35.7	33.0	31.8
83	86.7	81.4	68.9	60.1	41.1	30.3	27.2	26.6	28.0	31.0	33.1	31.6	29.0	26.9	25.9
84	57.3	55.1	47.8	42.4	29.7	22.9	21.1	21.0	22.1	24.4	26.0	25.2	23.3	21.9	20.7
85	34.8	33.5	30.3	27.5	20.5	16.7	15.8	16.0	16.8	18.7	19.9	19.5	18.5	17.6	16.7
86	19.2	18.7	17.6	16.0	13.2	11.7	11.4	11.7	12.4	13.6	14.3	14.2	14.1	13.9	13.0
87	9.6	9.7	9.5	9.3	8.4	8.0	8.1	8.5	9.2	9.9	10.2	10.3	10.4	10.4	9.8
88	5.5	5.6	5.6	5.7	5.7	5.7	5.9	6.2	6.8	7.1	7.3	7.5	7.7	7.7	7.3
89	3.8	3.7	3.7	3.8	4.0	4.2	4.4	4.8	5.3	5.6	5.7	5.9	6.1	6.2	5.8
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	108.6	105.5	95.8	87.6	83.4	78.3	73.2
75	96.7	93.3	84.2	78.4	75.5	70.7	66.0
76	83.8	81.8	73.9	69.5	68.1	63.5	59.3
77	70.6	70.2	64.3	60.7	59.5	56.3	52.6
78	61.1	59.5	55.5	53.1	52.5	49.7	46.4
79	52.8	50.4	47.6	46.0	45.8	43.3	40.1
80	44.6	42.6	40.7	39.7	39.4	37.5	34.1
81	37.2	35.6	34.2	33.8	33.5	31.9	28.8
82	30.9	29.3	28.6	28.5	28.0	26.8	23.9
83	24.7	23.8	23.2	23.3	23.0	21.9	19.4
84	19.5	19.2	18.7	18.7	18.4	17.5	15.3
85	15.4	15.3	14.9	14.9	14.4	13.6	11.5
86	11.8	11.8	11.7	11.8	11.3	10.0	7.8
87	8.8	8.4	8.5	8.9	8.3	6.9	4.6
88	6.4	5.8	5.9	6.5	5.9	4.4	2.9
89	5.1	4.7	4.6	4.8	4.1	2.8	2.3
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	01-24-2024
Type C Goniophotometer	01-29-2024

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:

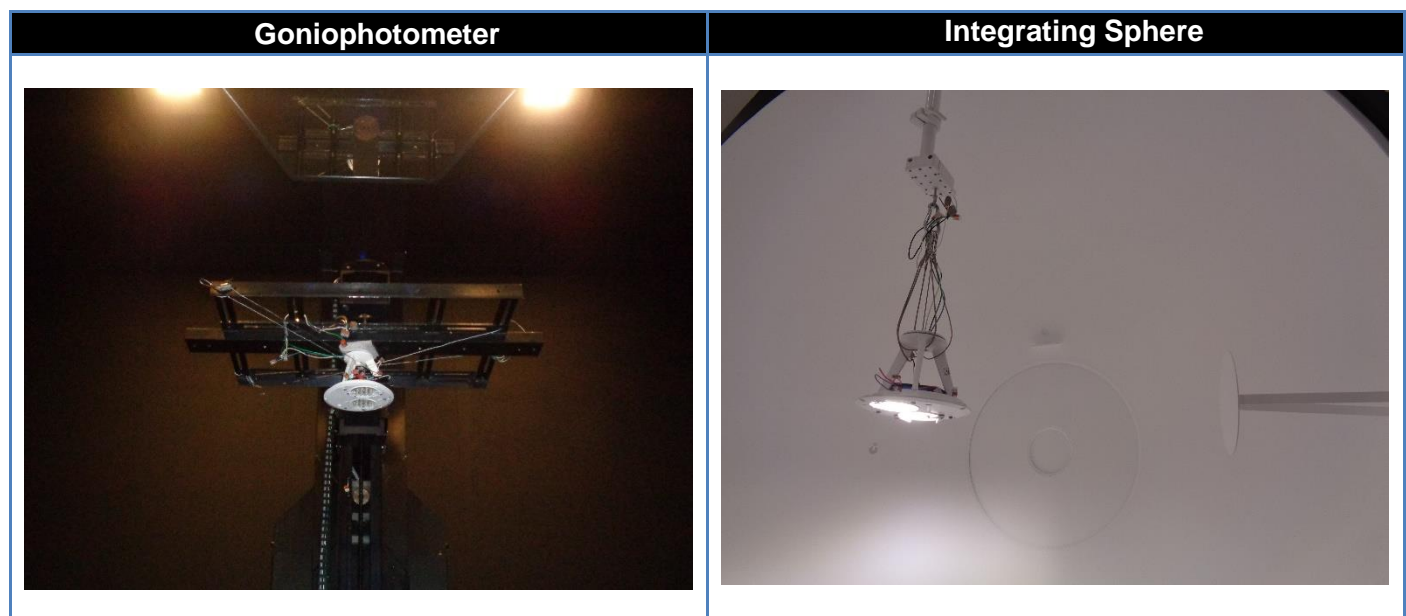
Data in this report tested under Non-Standard Conditions (i.e. temperature outside the allowed acceptance interval for the equipment/test) are identified with (~).

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
01/30/2024	A	DMS	Origination	J. Rocco	M. Hubbard

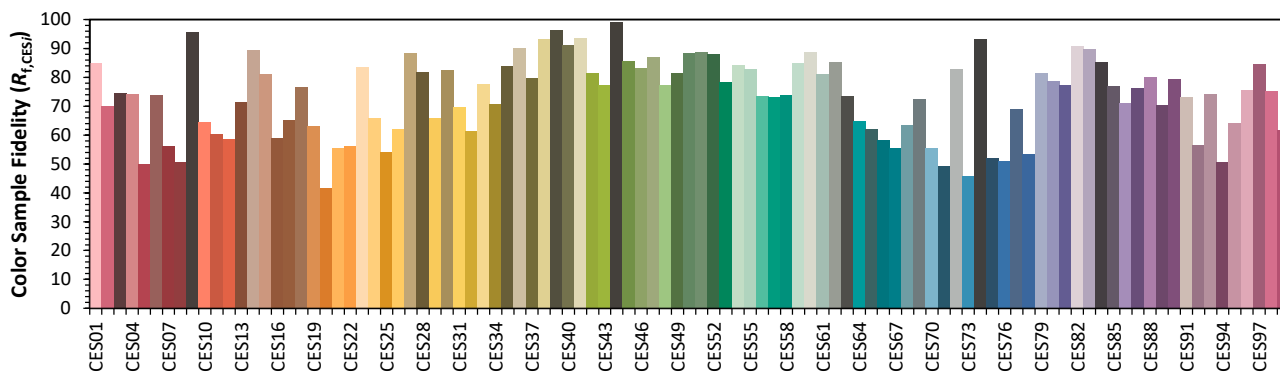
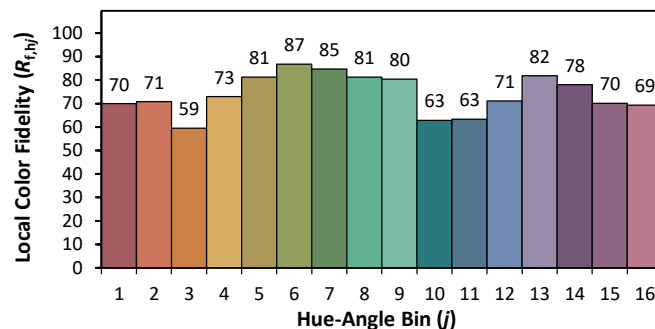
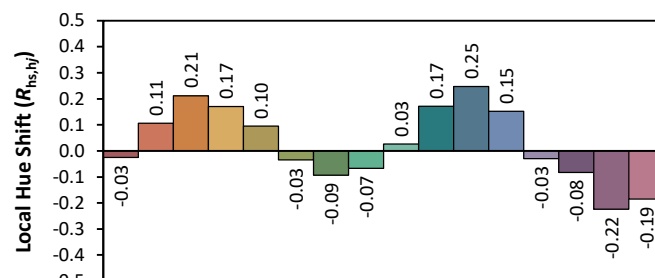
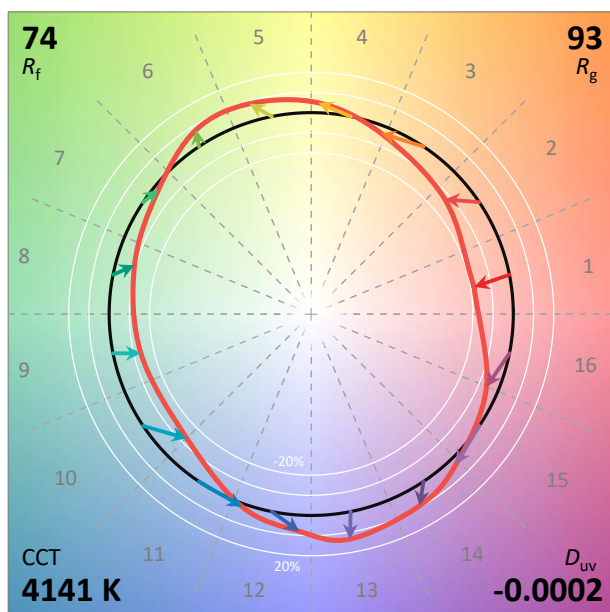
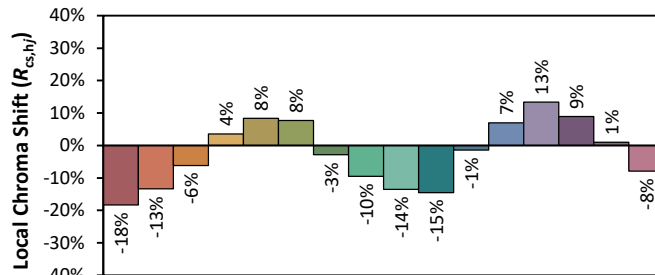
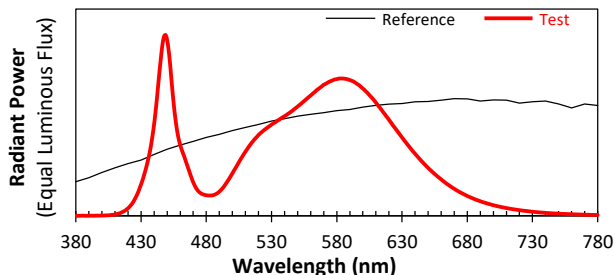
ANSI/IES TM-30-18 Color Rendition Report

Source: OSQP-C-3L-40K7-3R-UL (Light Engine)

Manufacturer: Cree Lighting

Date: 1/30/2024

Test: PL18122-001



Notes:

x 0.3743

y 0.3724

u' 0.2228

v' 0.4987

CIE 13.3-1995
(CRI)

R_a 72

R_g -39