

Report Number: PL18124-001A
Model: OSQP-C-3L-40K7-2R-UL (Light Engine)
Issue Date: 01/30/2024

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

Prepared For:

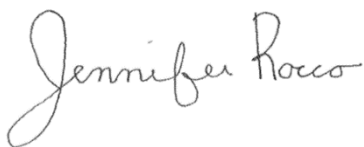
Tammy Lehrmann

Cree Lighting

9201 Washington Avenue

Racine, WI 53406

Prepared By:



Jennifer Rocco, Photometric Test Technician

Approved By:



Meranda Hubbard, Photometric Test Technician

Product Information

Manufacturer	Cree Lighting
Model Number (SKU)	OSQP-C-3L-40K7-2R-UL (Light Engine)
Serial Number	18124
LED Type	SSC STW7C12C-E0

Product Description

OSQP-C Pathway Luminaire (Light Engine), 3L Lumen Package, 4000K 70CRI, Type 2M 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	2883.5	2862.0	lm
Efficacy	145.78	144.76	lm/W
Correlated Color Temperature (CCT)	4135	K	
Color Rendering Index (CRI)	71		
R ₉	-40		
Duv	0.0000		
TM-30 R _f *	73		
TM-30 R _g *	93		
TM-30 R _{cs,h1} *	-18.4%		
S/P Ratio*	1.57		

	Sphere		Goniophotometer		
Electrical Measurements	120V	277V	120V	277V	
Input Wattage	19.78	19.83	19.77	19.91	W
Input Current	0.170	0.075	0.169	0.075	A
Input Voltage	120.01	277.20	120.19	277.35	V
Power Factor	0.968	0.957	0.972	0.957	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.07	0.20	0.08	0.08	%
Total Harmonic Distortion (Amperage)	11.23	10.34	12.69	9.76	%

Note: All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Max Candela	1659.27	Cd
Angle of Max Candela (Horizontal)	70	°
Angle of Max Candela (Vertical)	66	°

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	52	30	min
Total Operating Time (Stabilization + Test)	62	50	min
Ambient Temperature	24.45	24.8	°C

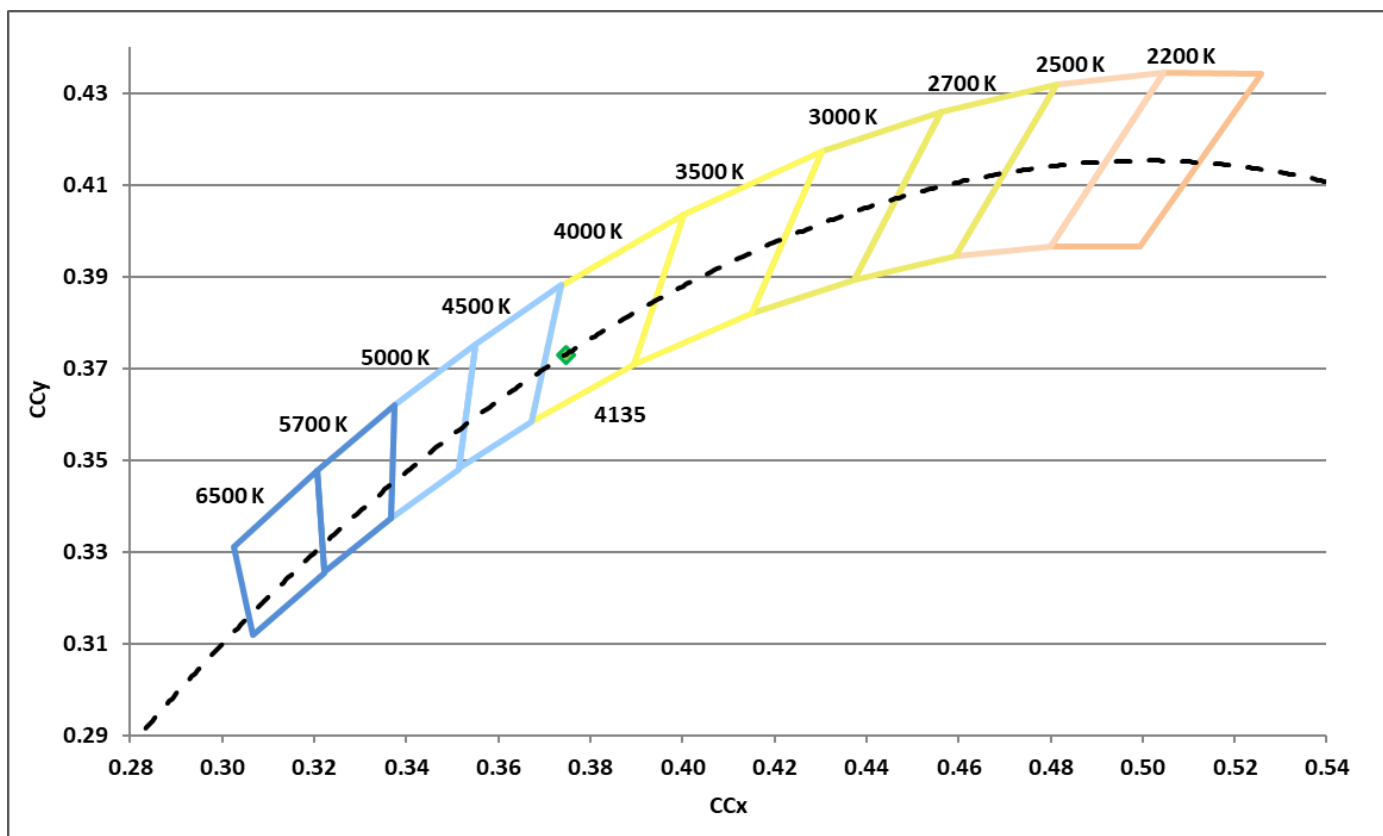
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3747	0.3730	0.2228	0.3327	0.2228	0.4991	0.0000

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
71	68	79	88	70	68	70	80	49	-40	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

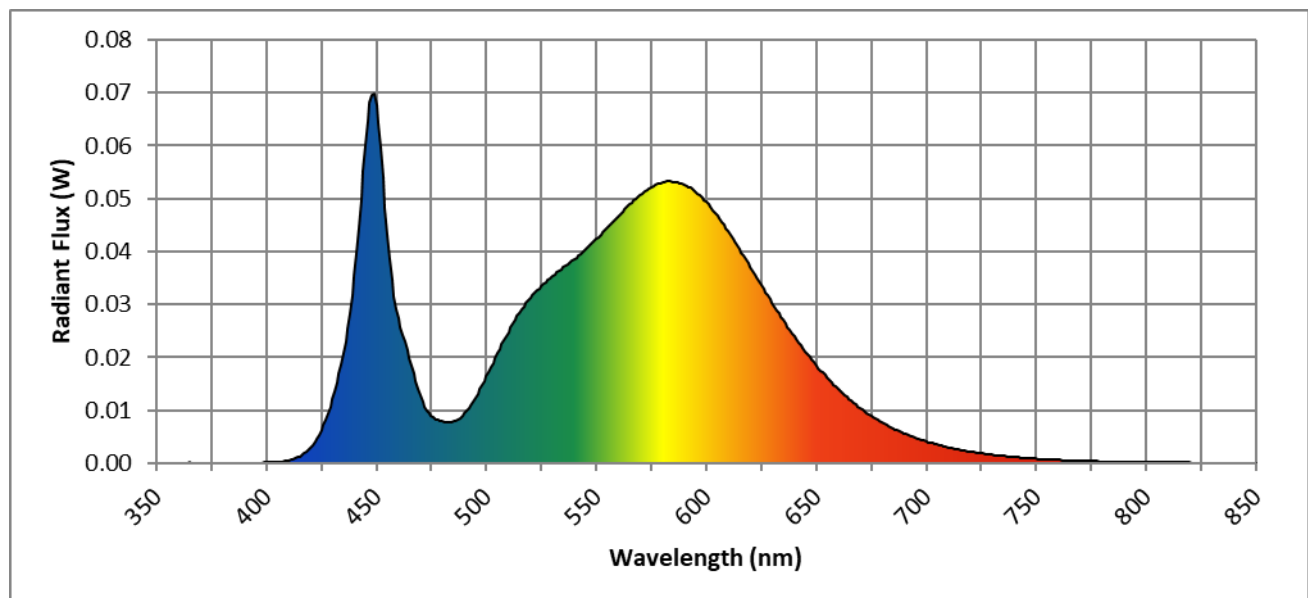
λ (nm)	W/nm
360	0.000046
370	0.000018
380	0.000021
390	0.000011
400	0.000092
410	0.000519
420	0.002883
430	0.012094
440	0.035406
450	0.067727
460	0.027253
470	0.012821
480	0.007894
490	0.009336
500	0.016404
510	0.024814
520	0.031261

λ (nm)	W/nm
530	0.035347
540	0.038605
550	0.042309
560	0.046605
570	0.050740
580	0.052984
590	0.052674
600	0.049333
610	0.043834
620	0.037103
630	0.030285
640	0.023972
650	0.018508
660	0.014036
670	0.010419
680	0.007652
690	0.005607

λ (nm)	W/nm
700	0.004101
710	0.002985
720	0.002173
730	0.001565
740	0.001133
750	0.000825
760	0.000604
770	0.000435
780	0.000310
790	0.000227
800	0.000152
810	0.000102
820	0.000085
830	0.000048

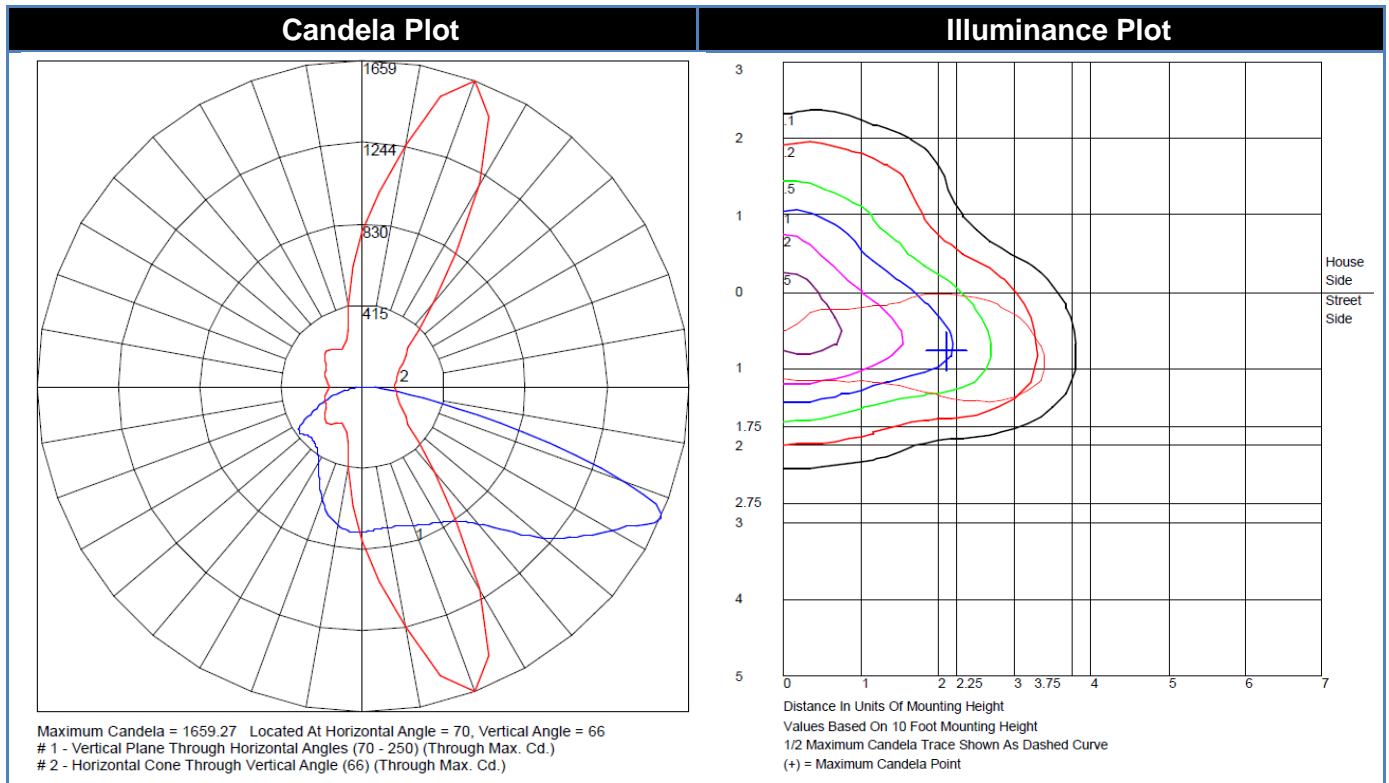
Dominant Wavelength	578	nm
Peak Wavelength	448	nm

Spectral Power Distribution (W/nm)



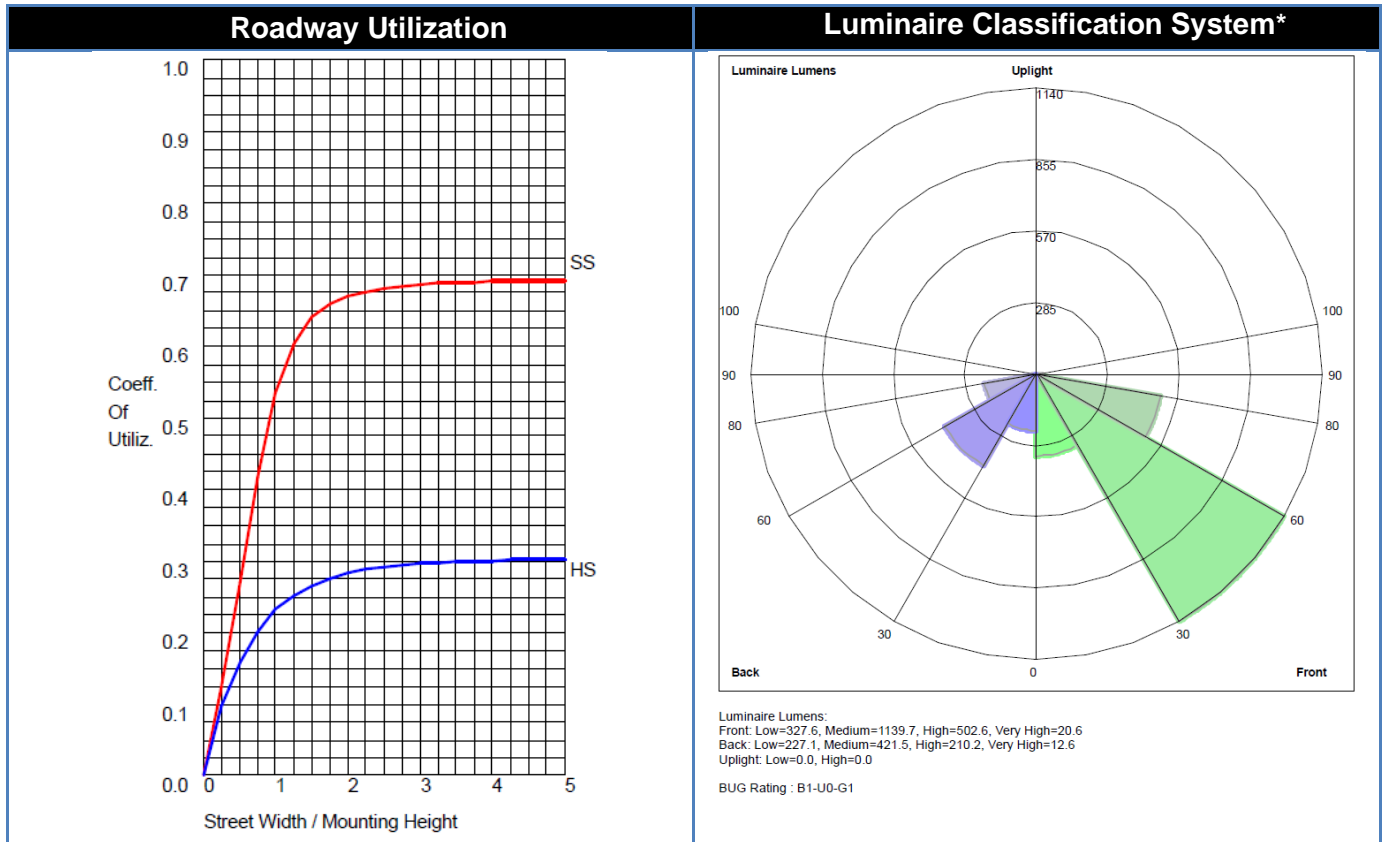
Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens
0-20	259.1	9.1	0-10	69.2
0-30	554.7	19.4	10-20	190.0
0-40	985.2	34.4	20-30	295.6
0-60	2115.9	73.9	30-40	430.5
0-80	2828.7	98.8	40-50	562.0
0-90	2861.9	100.0	50-60	568.7
10-90	2792.8	97.6	60-70	478.9
20-40	726.1	25.4	70-80	233.9
20-50	1288.1	45.0	80-90	33.2
40-70	1609.6	56.2	90-100	0.0
60-80	712.8	24.9	100-110	0.0
70-80	233.9	8.2	110-120	0.0
80-90	33.2	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	2861.9 LM	100%		



Roadway Summary	Lumens	% Lamp
Distribution	TYPE II SHORT	
Downward Street Side	1990.5	69.6
Downward House Side	871.4	30.4
Downward Total	2861.9	100.0
Upward Street Side	0.0	0.0
Upward House Side	0.0	0.0
Upward Total	0.0	0.0
Total Lumens	2861.9	100

Luminaire Classification System (LCS)	Lumens	% Luminaire
FL - Front Low (0-30)	327.6	11.4
FM - Front Medium (30-60)	1139.7	39.8
FH - Front High (60-80)	502.6	17.6
FVH - Front Very High (80-90)	20.6	0.7
BL - Back Low (0-30)	227.1	7.9
BM - Back Medium (30-60)	421.5	14.7
BH - Back High (60-80)	210.2	7.3
BVH - Back Very High (80-90)	12.6	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	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5
1	734.5	733.2	732.9	733.3	734.5	734.4	734.7	734.8	735.8	735.9	737.0	738.1	739.0	740.5	741.5
2	730.7	729.8	729.6	730.0	731.0	731.1	731.3	731.7	732.7	732.9	734.2	735.6	736.6	738.4	739.4
3	727.4	726.8	726.5	726.9	728.1	728.3	728.6	729.1	730.3	730.7	732.1	733.6	734.7	736.6	737.8
4	724.7	724.1	723.8	724.3	725.6	725.7	726.1	726.7	728.0	728.4	729.8	731.3	732.5	734.5	735.8
5	722.2	721.9	721.5	722.1	723.3	723.4	723.9	724.5	726.0	726.3	727.7	729.2	730.3	732.2	733.6
6	720.0	719.7	719.4	720.2	721.4	721.7	722.5	723.3	724.7	724.8	726.1	727.6	728.5	730.4	731.6
7	718.0	717.9	717.6	718.6	720.0	720.6	721.5	722.3	723.8	724.2	725.7	726.7	727.6	729.1	730.2
8	716.0	715.7	715.8	716.7	718.7	719.8	721.1	722.3	724.2	724.5	726.0	727.1	727.8	729.0	729.1
9	713.8	713.7	714.0	715.5	717.8	719.5	721.3	723.1	725.4	726.2	727.6	728.2	728.7	729.5	729.0
10	711.6	711.8	712.3	714.3	717.4	719.7	722.0	724.4	727.4	728.3	729.9	730.4	730.4	730.5	729.2
11	709.4	709.6	710.5	713.1	716.7	719.8	723.3	726.4	729.7	731.0	732.4	733.3	732.8	732.3	730.2
12	707.6	708.2	709.4	712.5	716.7	720.6	725.2	728.9	732.8	734.2	736.0	736.9	735.9	734.6	731.7
13	706.8	708.0	709.3	712.8	717.5	722.1	727.3	732.1	736.8	738.3	740.4	740.9	739.5	737.7	734.0
14	707.7	709.3	710.6	714.2	719.6	724.6	730.2	735.5	741.2	743.4	745.4	745.6	743.8	741.2	736.5
15	709.6	711.6	713.1	717.0	722.8	728.3	734.4	740.3	746.1	749.1	751.3	751.2	748.9	745.5	739.7
16	711.7	714.2	716.5	721.0	727.5	733.5	740.5	746.4	752.3	755.6	757.7	757.5	754.6	750.3	743.1
17	714.4	717.0	719.8	725.0	732.5	739.5	747.3	753.5	759.9	763.1	765.1	764.2	760.6	755.0	746.3
18	717.0	720.1	723.5	729.3	737.7	745.7	754.5	761.7	768.3	771.3	773.2	771.8	766.8	759.8	749.3
19	720.1	723.9	727.6	734.1	743.6	752.7	762.7	770.4	777.6	781.3	782.3	780.0	773.3	764.8	752.3
20	724.6	729.2	733.6	740.8	751.0	760.5	771.5	780.2	788.0	792.0	792.4	788.5	780.5	770.0	755.7
21	732.4	737.4	742.3	749.8	760.2	770.5	781.6	791.1	799.3	802.8	802.5	797.4	788.2	775.5	759.0
22	742.4	748.2	753.5	761.7	772.3	783.0	794.0	803.9	812.1	814.5	813.8	807.4	796.2	781.8	762.5
23	755.4	762.1	767.8	776.8	788.0	799.2	810.3	819.5	826.7	828.0	825.8	818.2	805.1	788.4	766.0
24	771.3	778.7	785.6	795.5	806.8	818.3	829.2	838.2	844.0	843.0	839.3	830.1	815.2	795.6	770.5
25	791.4	799.3	806.1	816.9	828.6	839.7	850.4	858.9	864.2	859.1	853.1	842.3	825.0	802.8	775.1
26	813.5	822.6	829.9	842.2	853.6	866.5	876.4	883.2	885.5	878.5	868.7	855.1	835.0	810.4	779.3
27	836.3	846.2	854.5	870.4	884.2	894.6	904.3	908.8	909.1	899.8	887.6	869.0	846.2	818.2	783.7
28	858.6	868.9	879.8	896.5	912.8	925.2	934.2	936.8	934.7	923.0	906.8	885.4	858.1	826.7	788.6
29	876.1	888.0	901.6	919.9	939.8	954.3	964.7	966.0	961.7	947.2	927.1	901.6	870.1	835.5	793.9
30	892.0	907.6	922.2	941.2	963.6	983.3	995.9	998.5	993.0	974.6	949.1	919.5	885.0	845.6	799.8
31	907.5	924.3	941.3	962.8	987.5	1008.6	1023.7	1029.0	1023.6	1003.6	976.2	939.5	900.2	856.4	806.1
32	923.9	939.2	958.9	982.0	1006.7	1030.9	1048.3	1056.4	1053.7	1033.1	1002.8	963.1	916.6	868.0	813.6
33	937.1	953.5	974.7	999.6	1026.0	1051.5	1070.8	1082.0	1081.5	1062.7	1030.0	987.2	934.9	882.6	821.4
34	952.5	969.0	992.5	1018.4	1046.0	1072.6	1092.8	1106.2	1107.7	1092.1	1059.4	1013.0	955.2	896.9	830.6
35	969.2	985.4	1011.1	1038.8	1067.6	1095.3	1115.5	1129.5	1133.4	1120.1	1090.6	1041.4	980.3	913.4	841.1
36	984.5	1001.4	1029.2	1057.4	1088.3	1116.7	1138.3	1152.7	1157.9	1146.0	1119.3	1070.2	1003.9	930.4	852.8

Candela Tabulations (Continued)

	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
0	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5	740.5
1	742.2	743.2	745.6	748.0	746.3	744.6	744.3	744.3	744.0	743.1	742.9	742.0	741.5	741.9	741.3
2	740.6	741.7	744.5	747.1	745.7	744.4	744.6	745.0	745.0	744.4	744.7	743.9	743.7	744.4	744.1
3	739.2	740.3	743.4	746.3	745.1	744.2	744.7	745.4	745.5	745.2	745.7	745.2	745.2	745.9	745.3
4	737.1	738.4	741.5	744.8	743.6	743.2	743.9	744.5	745.0	744.8	745.3	744.7	744.6	745.0	744.0
5	734.8	736.3	739.1	742.4	741.1	740.9	742.0	742.9	743.4	743.0	743.3	742.4	741.8	741.7	740.1
6	732.7	733.7	736.6	739.3	738.2	737.9	739.0	739.9	740.5	739.9	739.9	738.7	737.4	736.8	734.1
7	730.9	731.6	733.8	736.1	734.7	734.1	735.0	735.8	736.6	735.7	735.0	733.4	731.6	729.8	725.6
8	729.3	729.5	731.2	733.1	731.0	729.8	730.3	730.9	731.1	729.6	728.9	726.6	723.3	719.5	712.6
9	728.4	727.8	728.8	730.0	727.2	725.4	725.3	725.3	724.7	722.4	721.2	717.8	711.9	705.4	696.3
10	728.0	726.6	726.6	726.9	723.3	720.8	719.8	718.9	717.3	714.4	711.6	706.2	697.9	689.1	677.9
11	727.9	725.2	724.3	723.7	719.1	715.8	714.2	712.2	709.6	705.7	700.3	692.2	681.6	671.6	659.0
12	728.3	724.4	722.3	720.6	714.8	710.0	707.4	704.5	700.8	694.9	686.7	676.1	664.0	653.0	639.3
13	729.5	724.2	720.7	717.6	710.6	704.3	700.1	695.9	690.8	682.5	671.3	659.0	645.2	634.2	620.1
14	730.9	724.6	719.5	714.6	705.9	698.0	692.3	686.4	679.1	668.7	654.7	641.4	626.9	615.1	601.6
15	732.9	725.2	718.4	711.4	700.6	691.4	683.5	675.9	666.2	653.0	637.1	622.7	608.2	596.3	583.1
16	734.7	725.4	716.8	707.9	695.0	683.7	673.8	664.1	652.0	635.4	618.2	602.8	588.9	577.0	564.1
17	736.3	724.8	714.4	703.6	688.8	675.5	663.5	651.6	636.4	616.6	598.7	583.8	569.7	557.8	545.2
18	737.5	723.9	711.3	698.2	681.3	665.6	651.9	637.8	619.0	597.7	579.1	565.2	551.2	539.2	527.1
19	738.5	722.7	707.6	692.2	672.5	654.6	639.3	622.8	600.2	578.0	560.0	545.5	532.3	520.3	508.9
20	739.2	721.0	703.7	685.4	663.2	642.7	625.4	606.4	581.4	558.0	540.9	525.9	513.0	501.3	490.2
21	740.0	719.0	698.9	678.2	653.6	630.8	611.4	589.8	562.5	538.4	521.6	507.4	494.7	483.7	472.8
22	740.6	716.9	693.9	671.0	643.7	618.4	596.8	572.5	544.1	520.1	503.3	489.7	477.2	467.0	456.3
23	741.3	714.5	688.9	663.5	633.9	605.8	582.3	555.1	525.9	502.3	486.0	472.6	460.6	450.9	441.0
24	742.7	712.5	683.9	656.3	624.0	594.1	567.7	538.4	509.3	486.4	469.7	456.4	445.2	435.8	426.9
25	743.7	710.3	678.8	648.4	614.5	582.1	553.9	522.7	493.9	471.5	454.9	442.0	431.3	422.6	414.4
26	744.3	707.9	673.5	640.7	604.5	570.4	540.2	507.1	479.0	457.5	441.3	429.0	418.5	410.6	403.0
27	745.4	705.6	667.7	632.5	594.2	558.1	526.3	492.3	464.7	443.9	428.6	416.6	406.7	399.0	393.0
28	747.1	703.7	662.4	624.2	584.0	546.3	513.1	478.1	451.4	431.4	416.9	405.8	396.2	389.3	384.7
29	749.0	702.0	657.6	616.1	573.9	535.3	500.5	465.3	439.3	419.8	406.2	395.4	387.0	381.2	378.4
30	751.5	700.7	652.8	608.0	564.1	524.3	487.9	452.4	427.5	409.2	396.2	386.3	378.9	374.5	373.5
31	754.2	699.8	648.5	600.5	554.8	513.7	476.0	440.7	416.4	399.2	387.1	378.0	371.9	369.4	369.8
32	757.3	699.7	645.0	594.3	546.1	503.7	465.1	430.4	406.6	390.5	379.1	370.9	366.2	365.2	367.3
33	760.8	699.7	642.5	588.5	538.1	494.8	454.8	421.4	398.0	382.9	372.5	365.4	361.8	362.3	365.8
34	765.1	700.0	639.6	583.1	530.8	486.2	445.4	412.8	390.4	376.1	366.7	360.5	358.1	360.1	365.1
35	770.2	701.2	637.2	578.1	524.1	478.3	436.9	405.4	383.8	370.5	361.8	356.4	355.3	358.8	363.7
36	776.1	703.0	636.0	574.7	518.1	470.9	429.8	399.1	378.4	365.8	357.8	353.3	353.6	357.3	361.5

Candela Tabulations (Continued)

	150	155	160	165	170	175	180
0	740.5	740.5	740.5	740.5	740.5	740.5	740.5
1	741.6	741.2	741.5	740.4	740.2	740.6	742.4
2	744.4	744.3	744.8	743.6	743.4	743.7	745.2
3	745.5	745.2	745.5	744.2	743.8	743.9	744.6
4	744.0	743.4	743.2	741.7	741.3	741.0	740.7
5	739.6	738.7	737.9	736.2	735.2	734.9	733.7
6	732.9	731.0	729.1	726.4	724.8	723.5	720.8
7	722.8	718.4	714.7	710.5	707.9	706.3	700.9
8	707.6	701.0	695.4	689.5	686.2	684.5	677.4
9	689.1	680.6	674.0	666.8	662.4	660.5	652.5
10	669.3	659.2	651.5	643.6	638.6	636.4	628.8
11	648.6	638.1	629.7	622.0	615.5	614.0	606.0
12	628.0	617.7	609.1	600.3	594.5	592.7	585.3
13	608.7	598.3	589.4	580.8	574.8	572.4	565.8
14	590.1	579.2	570.0	562.3	556.4	553.4	547.7
15	571.7	561.0	551.4	543.6	537.8	534.5	528.6
16	553.0	542.8	533.3	525.2	518.9	515.4	509.9
17	534.4	524.5	515.4	507.0	500.7	496.5	492.0
18	516.5	506.1	496.8	489.3	483.2	479.4	475.3
19	498.5	488.2	479.6	472.1	466.0	463.0	458.6
20	480.6	471.0	463.0	455.6	450.2	447.3	442.5
21	463.8	455.0	447.5	440.6	435.4	432.6	428.8
22	448.1	440.2	433.3	427.2	422.0	419.8	416.2
23	433.2	426.9	420.6	414.9	410.1	408.3	404.9
24	419.9	414.4	409.3	404.3	399.9	398.4	395.3
25	407.9	403.8	399.5	395.5	391.7	390.4	388.2
26	397.8	394.4	391.6	388.6	385.2	384.0	382.0
27	388.8	386.9	385.3	383.1	380.4	379.0	377.7
28	381.8	381.2	381.0	379.7	377.7	376.3	375.3
29	377.1	378.1	378.6	378.2	376.3	374.9	374.2
30	374.0	376.2	378.0	378.2	376.3	374.7	374.0
31	372.1	375.5	378.1	379.0	376.8	374.4	373.3
32	371.3	375.8	379.1	379.6	376.7	373.7	372.1
33	371.3	376.2	379.0	379.0	375.8	372.1	370.1
34	370.7	375.2	377.4	377.2	374.4	370.9	369.3
35	368.5	372.4	375.0	375.7	374.2	371.6	371.1
36	365.5	369.9	373.4	375.6	375.9	374.9	375.5

Candela Tabulations (Continued)

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
37	998.9	1015.1	1045.0	1075.2	1106.8	1136.8	1159.8	1176.2	1181.0	1170.7	1147.4	1099.7	1029.0	949.6	865.2
38	1010.8	1027.1	1059.0	1091.0	1124.2	1155.6	1181.0	1199.1	1205.7	1196.6	1175.8	1129.7	1056.2	972.4	880.3
39	1020.9	1037.3	1070.2	1103.8	1138.1	1171.6	1199.6	1219.9	1230.1	1222.4	1202.6	1160.0	1085.5	995.8	896.1
40	1026.9	1042.6	1077.4	1111.5	1147.0	1183.0	1214.2	1237.7	1251.6	1246.2	1228.5	1188.6	1113.4	1019.5	913.5
41	1026.6	1042.2	1078.8	1113.9	1151.1	1189.5	1223.8	1252.6	1271.5	1269.4	1254.6	1216.2	1142.0	1045.3	932.3
42	1020.5	1035.9	1073.5	1110.5	1150.1	1191.4	1229.4	1263.9	1289.1	1291.4	1281.1	1246.1	1174.2	1074.8	955.2
43	1008.2	1023.1	1062.2	1101.0	1141.9	1186.3	1230.2	1269.4	1301.7	1310.5	1305.1	1274.6	1207.1	1106.5	982.1
44	988.7	1002.6	1043.9	1084.1	1126.3	1174.6	1224.1	1269.6	1308.5	1325.5	1326.7	1301.7	1239.1	1138.9	1010.5
45	963.2	975.4	1016.8	1058.2	1102.9	1155.0	1209.9	1263.3	1309.2	1336.2	1345.8	1329.3	1272.6	1174.1	1041.0
46	930.5	941.1	982.6	1023.8	1071.0	1127.6	1187.5	1249.0	1304.2	1341.4	1362.8	1355.7	1308.3	1213.0	1074.7
47	889.8	899.7	944.1	983.8	1030.9	1092.7	1158.3	1226.9	1292.8	1340.3	1374.3	1379.7	1340.8	1249.6	1107.5
48	848.4	857.6	897.6	938.5	985.5	1049.3	1121.5	1198.1	1273.7	1332.1	1379.4	1399.1	1370.4	1284.8	1138.6
49	803.4	811.5	850.8	883.9	933.8	998.5	1077.2	1160.3	1245.0	1315.7	1376.8	1414.6	1398.5	1320.7	1170.1
50	755.3	763.8	801.6	830.8	873.9	942.4	1025.7	1115.5	1207.2	1289.7	1366.0	1423.5	1422.4	1354.1	1202.1
51	707.7	718.4	754.1	777.1	816.5	882.5	971.8	1066.9	1164.8	1260.4	1349.6	1425.3	1439.0	1379.8	1228.6
52	663.3	672.5	707.9	727.0	759.8	822.2	913.6	1011.6	1116.3	1219.9	1327.5	1420.1	1452.5	1404.2	1254.0
53	618.1	625.6	660.7	676.5	707.4	761.9	847.4	950.6	1056.7	1170.6	1296.1	1408.0	1463.4	1429.1	1282.4
54	569.9	574.6	608.4	627.5	656.3	706.8	782.6	884.0	996.0	1119.8	1259.4	1390.4	1468.8	1449.6	1309.8
55	523.0	526.1	555.4	577.2	605.6	654.7	722.4	820.5	935.3	1067.3	1219.4	1369.0	1469.8	1467.0	1333.8
56	480.3	480.9	505.8	526.5	553.6	600.7	664.5	754.9	867.4	1005.1	1173.1	1340.1	1465.2	1485.4	1361.7
57	443.9	443.1	462.9	477.5	502.6	546.7	607.8	691.3	797.7	940.6	1119.5	1305.8	1455.6	1501.8	1390.9
58	412.9	413.3	427.5	436.9	456.2	497.9	553.5	632.5	732.9	876.3	1065.8	1268.4	1440.5	1510.8	1414.4
59	384.8	385.0	396.2	403.4	417.3	450.3	501.8	574.5	672.3	809.1	1006.9	1224.5	1419.2	1516.1	1438.0
60	351.6	347.8	361.1	370.5	382.4	406.4	450.3	514.9	607.2	736.6	942.9	1174.4	1391.7	1519.3	1466.8
61	305.7	298.6	313.1	329.3	349.6	370.8	401.4	460.3	547.4	674.0	874.9	1123.7	1364.5	1520.1	1493.6
62	261.0	255.5	267.8	281.8	306.9	337.0	363.6	411.4	493.8	615.5	811.6	1071.7	1333.6	1520.0	1522.1
63	226.3	222.7	232.9	244.6	264.8	294.8	330.5	364.1	438.9	553.4	743.5	1010.3	1295.7	1521.6	1562.9
64	201.0	200.5	209.0	218.1	232.5	258.0	294.6	325.8	385.7	497.8	676.9	951.5	1260.0	1526.6	1607.5
65	180.1	181.0	189.5	198.0	211.3	232.7	263.4	295.9	340.9	448.8	619.2	895.9	1229.1	1529.5	1641.1
66	162.7	163.7	171.4	178.9	193.0	211.2	239.0	268.6	303.1	397.3	564.0	835.0	1188.0	1518.2	1659.3
67	148.8	149.5	154.9	161.8	173.9	192.4	215.8	241.9	269.9	346.5	506.7	765.9	1129.1	1483.1	1652.2
68	140.1	139.3	141.7	146.6	156.1	175.0	196.1	219.9	244.8	306.6	454.4	701.2	1064.0	1428.5	1608.2
69	136.1	134.1	131.9	134.8	141.2	158.1	178.0	199.4	222.6	270.5	406.8	632.7	980.4	1344.5	1531.6
70	135.2	131.4	125.2	126.4	128.4	141.1	159.7	179.4	200.5	238.3	354.3	559.7	879.1	1226.0	1420.1
71	131.9	126.5	118.2	118.7	118.7	127.7	141.4	161.3	180.1	213.4	307.1	492.6	776.2	1103.4	1283.6
72	126.5	119.6	111.5	110.3	110.4	116.8	126.5	144.2	162.4	193.2	268.3	432.4	683.7	975.0	1148.3
73	120.0	111.8	104.6	102.7	103.3	106.7	113.0	127.8	146.1	172.3	234.0	372.4	581.5	828.9	999.2

Candela Tabulations (Continued)

	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
37	782.5	705.2	635.5	571.5	513.0	464.6	423.4	393.6	373.6	361.9	354.5	351.0	352.5	355.5	358.7
38	790.2	707.7	635.0	568.5	508.4	459.0	418.0	388.7	369.4	358.3	351.3	349.0	350.6	352.9	356.0
39	799.2	711.8	635.6	566.9	504.6	454.4	414.0	384.5	366.0	354.9	348.3	346.8	348.4	349.9	354.6
40	809.0	717.1	637.2	566.0	501.7	450.2	410.7	381.0	363.1	351.9	345.6	344.8	346.3	348.6	356.7
41	820.9	723.0	639.1	566.1	499.7	447.0	408.2	378.2	360.2	349.2	343.3	342.6	344.4	350.0	362.7
42	836.9	731.1	642.8	567.3	498.8	445.0	406.4	376.0	357.7	346.8	341.0	340.7	344.3	355.5	374.3
43	857.3	740.6	647.3	569.2	498.7	444.2	405.7	374.4	355.9	344.7	339.1	339.3	348.1	367.3	390.8
44	875.9	751.9	652.9	571.7	499.2	444.0	405.7	373.4	354.4	343.5	338.0	340.1	357.6	383.8	397.8
45	897.1	765.0	660.2	576.1	501.5	445.0	406.3	373.5	353.8	342.8	337.0	346.0	372.1	388.6	380.0
46	922.6	780.9	670.0	582.3	505.0	447.4	407.8	374.4	353.8	342.0	338.3	356.5	373.6	369.3	347.6
47	946.4	796.0	680.6	588.7	508.8	450.7	410.0	376.0	354.0	341.8	343.1	357.8	357.3	340.8	326.6
48	969.4	812.9	691.1	596.1	513.0	454.7	412.6	377.8	354.7	344.4	346.5	344.9	336.1	323.9	316.9
49	994.4	830.8	703.6	606.9	519.1	460.1	416.9	380.7	357.2	348.2	340.1	324.9	324.0	315.6	309.7
50	1018.6	847.8	717.1	618.8	526.6	465.7	421.2	384.7	362.2	346.4	323.9	314.1	319.2	310.0	303.3
51	1037.9	861.4	729.4	630.0	533.4	470.8	424.7	388.9	365.9	335.6	313.5	310.6	315.7	305.4	295.4
52	1060.8	877.8	743.0	643.3	541.4	477.3	429.5	394.2	363.2	327.9	307.6	307.5	313.1	301.3	286.9
53	1085.3	896.8	759.5	658.6	551.8	485.2	436.7	398.1	357.5	323.6	302.9	304.3	311.1	296.7	283.7
54	1106.7	914.5	776.2	672.6	561.1	492.0	441.2	395.8	354.3	320.1	298.7	301.4	308.8	292.2	280.5
55	1127.3	931.6	791.9	686.5	570.9	496.9	440.6	393.5	352.1	315.7	294.5	299.9	305.1	290.0	278.0
56	1156.0	956.4	811.8	704.7	584.6	500.3	438.8	392.6	349.8	311.2	290.4	297.8	299.7	287.6	276.4
57	1183.8	980.9	836.8	725.7	596.8	501.9	434.1	387.7	346.4	306.1	286.2	295.0	294.1	285.3	275.7
58	1207.0	1004.5	857.0	741.9	605.9	500.3	424.9	376.6	338.2	299.9	281.7	291.6	289.4	284.1	275.8
59	1238.5	1033.3	880.2	759.9	618.1	497.6	412.5	360.7	325.0	292.7	277.5	287.2	285.5	283.3	276.0
60	1277.1	1070.4	909.6	780.2	631.1	493.9	395.4	341.3	309.1	283.2	273.0	282.2	281.8	283.3	275.2
61	1313.2	1102.5	935.0	794.7	636.6	486.8	378.7	322.1	291.6	271.9	268.2	277.7	280.3	283.0	272.2
62	1357.0	1139.0	958.1	803.4	637.9	476.3	362.9	304.1	275.1	260.5	262.8	273.1	279.4	280.9	268.1
63	1416.4	1181.2	981.6	809.9	637.2	465.8	347.3	287.2	259.9	248.0	255.5	268.1	276.9	276.4	262.7
64	1467.0	1216.2	995.7	809.5	633.7	454.1	333.0	273.9	247.2	236.0	247.2	263.5	273.4	270.0	254.9
65	1501.1	1235.9	999.5	803.6	624.9	437.6	318.6	261.4	235.6	225.2	238.8	258.0	268.4	261.8	245.8
66	1530.1	1251.7	1000.6	794.6	613.5	419.3	302.2	248.5	224.3	214.5	230.7	250.2	260.3	253.2	235.1
67	1530.9	1253.6	995.1	783.5	596.7	398.1	284.8	233.5	211.9	203.6	221.8	240.9	250.1	241.9	223.2
68	1497.0	1226.3	976.2	765.4	573.8	377.0	267.3	219.7	200.7	193.1	211.6	229.7	236.3	227.8	209.5
69	1432.6	1180.0	943.8	740.9	548.7	357.3	249.5	206.1	188.8	183.6	201.1	217.1	221.5	211.5	193.4
70	1334.5	1113.8	900.7	708.2	519.1	337.1	231.4	193.0	176.6	172.9	190.0	202.0	203.5	192.9	176.1
71	1226.7	1036.1	850.3	669.7	487.5	313.3	214.4	180.2	164.6	162.5	178.1	186.7	185.3	173.5	160.3
72	1112.6	951.9	792.4	628.0	454.4	287.8	198.2	167.2	152.9	152.9	166.0	172.4	168.6	157.7	146.2
73	975.1	856.4	724.6	578.7	416.4	261.4	180.9	153.8	140.5	142.0	153.2	156.0	151.4	142.6	133.8

Candela Tabulations (Continued)

	150	155	160	165	170	175	180
37	363.0	368.5	373.0	376.9	380.3	381.5	385.3
38	361.7	369.1	376.1	382.8	389.9	393.8	400.1
39	363.6	374.3	385.0	394.2	402.8	407.1	412.7
40	369.4	384.8	397.6	406.1	412.5	415.0	416.1
41	380.6	398.3	407.3	410.8	412.7	411.5	408.0
42	395.4	406.1	405.4	402.0	399.3	395.9	388.7
43	402.8	398.4	388.5	381.0	378.2	374.5	369.2
44	390.7	374.6	363.4	360.6	360.9	357.3	350.4
45	360.8	348.2	345.9	347.5	344.9	333.7	320.5
46	336.3	334.1	336.4	327.9	318.4	309.2	301.1
47	324.9	326.6	318.3	305.5	300.0	292.1	286.5
48	318.2	313.6	299.0	291.8	288.2	282.9	279.4
49	309.1	294.9	288.6	284.2	282.8	279.4	278.0
50	294.5	286.3	282.6	281.7	282.2	280.2	279.5
51	286.3	281.0	280.5	281.2	283.1	280.7	279.7
52	281.5	278.5	278.6	280.3	282.3	279.1	276.7
53	277.8	276.1	276.1	277.9	279.4	275.6	272.1
54	275.4	273.4	273.4	274.4	274.6	270.0	266.0
55	273.3	270.9	269.3	270.0	269.2	264.8	261.7
56	271.3	267.6	264.9	266.0	265.5	261.5	258.9
57	269.4	264.1	261.9	263.0	263.1	258.9	256.0
58	267.3	261.1	259.0	260.5	260.7	256.9	252.1
59	266.1	258.3	256.0	257.8	257.6	252.8	246.0
60	264.2	255.2	252.5	253.6	251.9	244.4	236.0
61	261.8	251.3	247.7	246.7	243.0	232.6	222.1
62	258.0	246.6	240.8	239.3	231.3	217.8	206.2
63	252.0	239.7	231.2	230.8	217.8	204.4	194.4
64	243.1	229.9	220.9	221.4	208.5	195.4	185.4
65	231.7	218.1	213.2	213.5	200.8	187.0	177.7
66	218.9	206.1	206.5	204.0	192.0	175.9	169.0
67	205.1	195.6	196.4	193.3	182.6	167.5	157.6
68	191.4	185.4	184.9	180.8	168.8	156.4	144.5
69	178.5	174.2	171.7	166.8	155.2	144.0	130.2
70	164.8	162.2	157.0	150.9	139.3	127.9	115.4
71	150.9	148.5	141.0	132.4	120.0	111.2	102.2
72	139.6	133.6	125.6	115.2	105.3	98.7	91.7
73	128.1	119.4	111.4	102.1	93.2	87.0	81.3

Candela Tabulations (Continued)

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
74	112.5	103.4	96.6	95.0	96.5	97.9	100.8	111.8	130.0	154.7	204.5	319.6	487.4	701.7	848.9
75	103.4	95.4	87.9	87.8	89.6	90.5	91.4	98.5	116.1	139.6	181.3	276.2	414.1	597.3	723.6
76	94.3	87.1	80.2	80.4	82.5	83.2	84.1	86.2	102.1	124.0	160.3	234.2	345.7	493.1	607.0
77	84.4	78.8	73.4	73.5	76.1	76.1	76.5	75.4	88.4	108.6	140.1	194.2	282.6	396.4	492.3
78	73.2	70.2	66.9	66.4	70.0	69.8	70.2	67.0	76.1	95.4	121.4	163.3	234.0	320.1	396.1
79	62.5	61.0	59.3	59.5	62.7	64.3	65.1	60.3	65.1	81.8	103.7	134.8	190.3	251.1	313.3
80	52.1	50.6	50.2	51.5	55.2	58.2	59.9	54.6	54.5	68.0	86.1	107.8	146.4	188.6	239.8
81	40.6	39.8	40.2	42.3	45.9	50.0	53.6	48.2	45.4	55.9	71.0	85.8	111.3	143.6	181.2
82	30.0	29.8	31.1	32.5	36.0	41.0	45.0	42.3	37.6	45.5	57.1	67.9	84.6	107.5	136.1
83	22.2	21.2	22.3	23.1	26.3	30.9	34.9	34.2	29.6	34.4	43.4	51.2	60.6	74.4	93.8
84	15.7	15.3	15.9	16.6	19.1	22.1	25.8	26.5	22.1	25.1	31.2	36.4	41.8	48.4	57.6
85	11.8	11.1	11.4	12.1	13.5	16.3	18.7	18.1	16.1	18.2	22.2	25.0	26.8	29.7	35.1
86	8.4	7.7	7.9	8.4	9.2	10.5	11.8	12.0	10.9	12.2	14.2	15.5	15.5	17.3	19.6
87	6.1	5.7	5.7	6.1	6.4	6.6	7.3	7.4	7.5	8.0	8.7	9.1	9.2	9.5	10.3
88	4.9	4.4	4.5	4.7	4.9	5.1	5.2	5.1	5.3	5.5	5.7	6.0	6.2	6.2	6.1
89	3.6	3.2	3.4	3.7	3.8	4.0	4.1	4.0	4.1	4.1	4.1	4.3	4.5	4.4	4.1
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	849.2	757.9	651.2	523.1	375.1	233.8	163.0	140.0	128.4	130.4	138.6	139.0	134.2	126.4	121.3
75	739.2	668.3	582.3	467.8	335.8	207.8	146.1	126.0	116.5	119.9	124.7	124.1	118.4	111.3	107.9
76	619.9	576.5	507.2	410.3	294.3	181.0	127.5	110.7	104.0	108.6	110.5	108.8	103.6	97.4	95.2
77	511.2	484.8	434.1	352.1	251.5	153.9	108.7	94.5	91.3	96.5	96.9	94.2	89.0	84.6	81.9
78	425.3	410.8	372.5	302.2	214.5	130.7	92.7	79.9	79.2	85.4	84.9	80.8	76.3	72.3	68.3
79	340.8	341.8	312.4	254.4	179.3	109.1	76.8	66.3	68.4	74.2	72.7	69.4	63.3	59.6	56.0
80	264.6	268.5	252.3	208.5	145.7	88.4	62.1	54.4	57.3	62.3	61.5	57.3	51.9	48.8	46.4
81	208.1	209.9	202.5	167.2	117.5	72.0	50.3	44.6	47.6	51.8	51.2	47.1	42.3	40.6	38.7
82	158.5	161.6	155.6	128.4	90.9	58.2	40.1	36.5	38.9	42.6	41.9	38.9	34.7	33.5	32.0
83	107.6	112.2	109.7	92.2	64.8	44.2	31.3	29.5	31.1	34.0	33.8	31.5	28.2	26.8	25.8
84	68.9	73.1	72.1	61.9	44.1	32.2	24.3	23.4	24.8	26.9	27.3	25.3	22.6	21.2	20.4
85	41.9	45.1	46.6	40.6	29.6	22.3	18.4	18.2	19.2	20.8	21.3	20.1	17.9	17.1	16.1
86	22.7	24.1	25.7	23.7	18.8	14.9	13.1	13.4	14.3	15.4	15.9	15.5	14.1	13.5	12.7
87	11.3	12.2	13.3	13.4	11.6	9.8	9.0	9.5	10.2	10.8	11.3	11.4	10.7	10.5	9.8
88	6.2	6.6	7.1	7.3	7.1	6.5	5.9	6.4	7.0	7.5	7.9	8.2	7.9	7.8	7.3
89	3.8	4.1	4.2	4.3	4.4	4.4	4.1	4.5	5.1	5.5	5.7	5.8	5.8	5.9	5.3
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	114.4	106.5	97.4	90.2	83.0	78.5	73.5
75	100.0	92.8	85.7	79.7	74.7	70.9	66.5
76	86.6	81.2	74.4	70.7	66.9	63.6	59.8
77	73.7	70.0	64.5	61.6	59.2	56.6	52.9
78	62.0	59.8	55.7	53.6	52.0	49.9	46.3
79	53.2	50.9	48.2	46.4	45.3	43.6	40.2
80	44.8	43.6	41.2	39.9	39.0	37.3	34.4
81	37.5	36.3	34.6	33.8	32.9	31.6	28.9
82	31.0	29.8	28.7	28.3	27.5	26.4	24.0
83	25.0	24.1	23.3	23.1	22.5	21.8	19.4
84	19.8	19.1	18.6	18.4	18.2	17.6	15.4
85	15.6	15.1	14.7	14.5	14.4	13.9	11.8
86	12.1	11.9	11.6	11.3	11.0	10.5	8.5
87	9.1	9.0	8.9	8.8	8.3	7.5	5.4
88	6.5	6.3	6.4	6.5	6.0	4.9	3.2
89	4.7	4.3	4.3	4.5	4.1	3.1	2.0
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	01-30-2024
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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Exceptions:

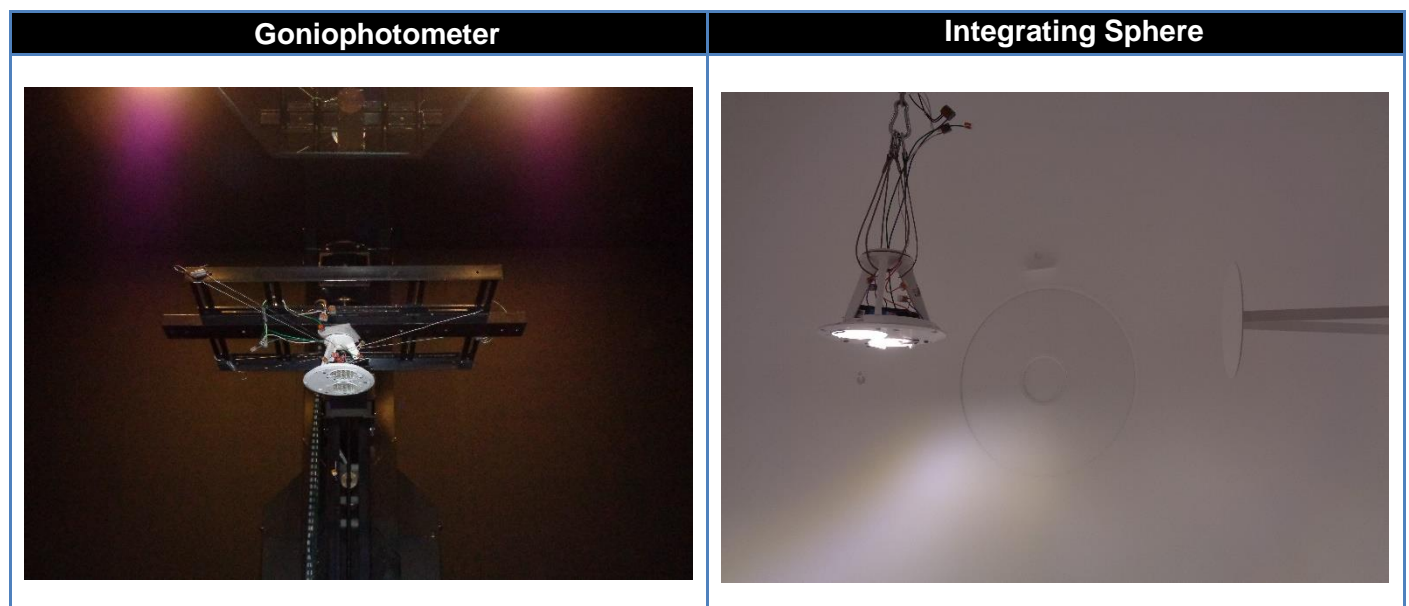
Data in this report tested under Non-Standard Conditions (i.e. temperature outside the allowed acceptance interval for the equipment/test) are identified with (~).

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

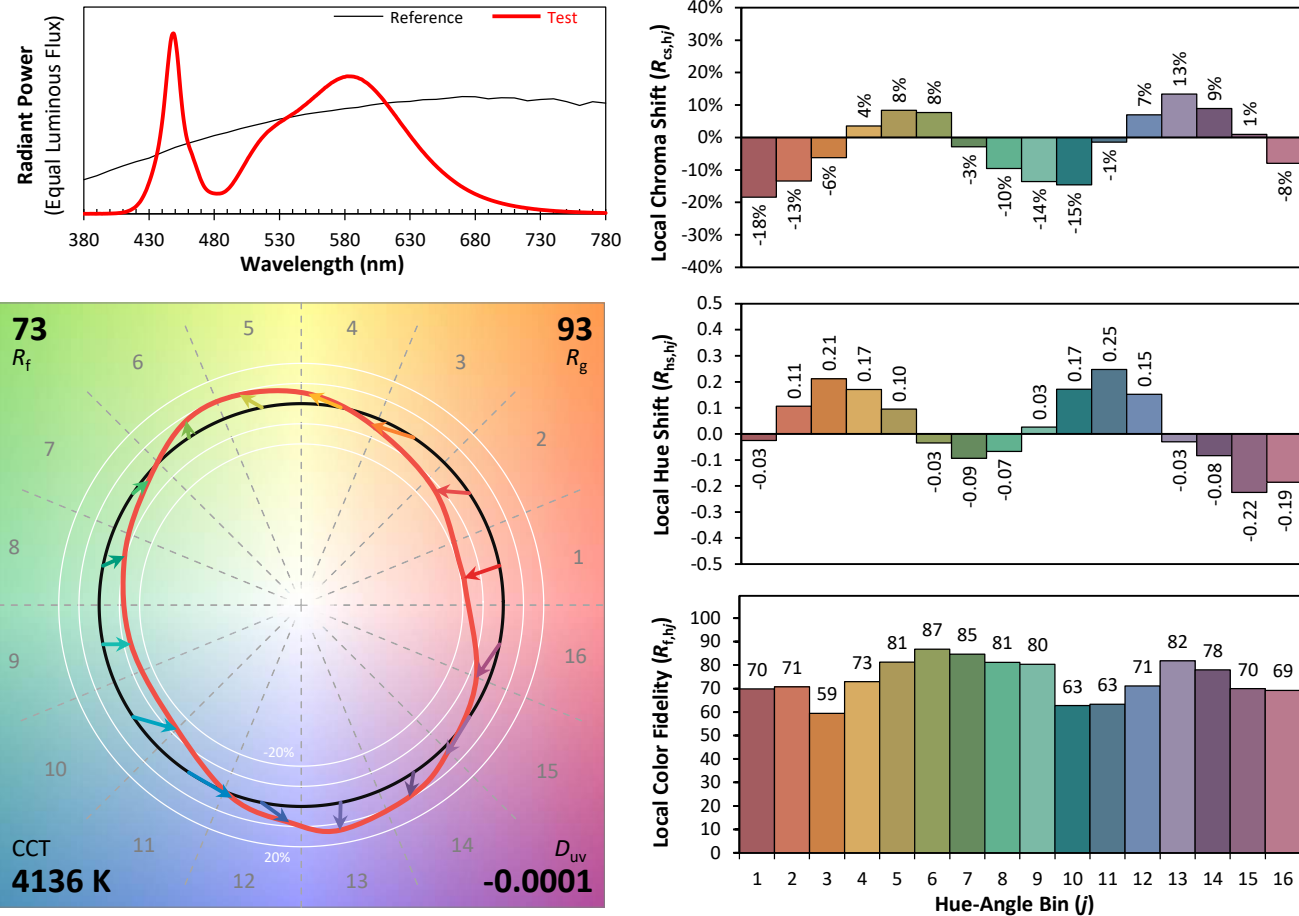
ANSI/IES TM-30-18 Color Rendition Report

Source: OSQP-C-3L-40K7-2R-UL (Light Engine)

Manufacturer: Cree Lighting

Date: 1/30/2024

Test: PL18124-001



Notes:

x 0.3746

y 0.3729

u' 0.2228

v' 0.4990

CIE 13.3-1995
(CRI)

R_a 71

R_g -40