
Nata

LumCAT: 2-1680-M	
Luminaire: 92.70.124.00	
Report No: NT2017071908	Voltage(V): 220.4000
Test No: GC2017071908	Current(A): 0.0690
LampCAT: SEOUL SAWx10 MTJ 12W	Power (W): 14.0800
Lamp flux(lm): 1550.0	PF: 0.9240
Number of Lamps: 1	Ballast type: DC
Length(mm): 70	Width(mm): 70
Phm Type: C	Height(mm): 0

Photometric Results

Lumens(lm): 1393.97
Efficiency(%): 89.93%
Lumens(lm)/Power(W): 99.00
Central intensity(cd): 5543.273
Maximum intensity(cd): 5543.273
Angle of maximum intensity: C=0.0 γ =0.0
Beam Angle(50%Imax): [C0/180]Total=22.8
[C90/270]Total=22.8
Field angle(10%Imax): [C0/180]Total=55.5
[C90/270]Total=55.5
Maximum s/h(1/2): C0_180=0.39 C90_270=0.39
Maximum s/h(1/4): C0_180=0.38 C90_270=0.38
Up flux rate of lamp(%): 0.00%
Down flux rate of lamp(%): 90.02%
Up flux rate of LUM(%): - -
Down flux rate of LUM(%): 100.00%
CIE Type : Direct lighting
Output flux ratio in π solid angle : 99.814%

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	5543.274	1.326	1.326	.086%	.095%
1.0	5524.887	10.574	11.9	.682%	.854%
2.0	5461.952	20.903	32.803	1.349%	2.353%
3.0	5379.528	30.874	63.678	1.992%	4.568%
4.0	5230.283	40.009	103.687	2.581%	7.438%
5.0	5062.999	48.390	152.077	3.122%	10.910%
6.0	4793.744	54.949	207.026	3.545%	14.852%
7.0	4497.633	60.108	267.134	3.878%	19.164%
8.0	4135.976	63.123	330.257	4.072%	23.692%
9.0	3745.318	64.250	394.507	4.145%	28.301%
10.0	3336.215	63.530	458.036	4.099%	32.858%
11.0	2933.666	61.385	519.421	3.960%	37.262%
12.0	2538.367	57.874	577.295	3.734%	41.414%
13.0	2159.832	53.279	630.575	3.437%	45.236%
14.0	1818.245	48.237	678.812	3.112%	48.696%
15.0	1542.436	43.778	722.589	2.824%	51.837%
16.0	1269.845	38.383	760.973	2.476%	54.590%
17.0	1063.478	34.097	795.069	2.200%	57.036%
18.0	961.634	32.587	827.656	2.102%	59.374%
19.0	858.056	30.634	858.291	1.976%	61.572%
20.0	778.538	29.200	887.491	1.884%	63.666%
21.0	717.256	28.187	915.678	1.819%	65.688%
22.0	675.360	27.744	943.422	1.790%	67.679%
23.0	641.062	27.468	970.89	1.772%	69.649%
24.0	617.222	27.530	998.42	1.776%	71.624%
25.0	595.970	27.620	1026.04	1.782%	73.606%
26.0	576.915	27.734	1053.774	1.789%	75.595%
27.0	563.609	28.059	1081.833	1.810%	77.608%
28.0	551.289	28.382	1110.215	1.831%	79.644%
29.0	538.250	28.616	1138.831	1.846%	81.697%
30.0	526.881	28.889	1167.72	1.864%	83.769%
31.0	516.904	29.195	1196.914	1.884%	85.864%
32.0	507.409	29.486	1226.401	1.902%	87.979%
33.0	493.993	29.504	1255.905	1.903%	90.095%
34.0	471.678	28.924	1284.829	1.866%	92.170%
35.0	423.970	26.667	1311.496	1.720%	94.083%
36.0	353.489	22.785	1334.281	1.470%	95.718%
37.0	286.013	18.876	1353.156	1.218%	97.072%

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
38.0	211.286	14.265	1367.421	.920%	98.095%
39.0	171.083	11.807	1379.228	.762%	98.942%
40.0	99.187	6.992	1386.219	.451%	99.444%
41.0	35.992	2.589	1388.809	.167%	99.630%
42.0	16.270	1.194	1390.003	.077%	99.715%
43.0	8.706	0.651	1390.654	.042%	99.762%
44.0	4.983	0.380	1391.033	.024%	99.789%
45.0	3.045	0.236	1391.269	.015%	99.806%
46.0	1.729	0.136	1391.406	.009%	99.816%
47.0	1.421	0.114	1391.52	.007%	99.824%
48.0	1.357	0.111	1391.63	.007%	99.832%
49.0	1.276	0.106	1391.736	.007%	99.840%
50.0	1.195	0.100	1391.836	.006%	99.847%
51.0	1.137	0.097	1391.933	.006%	99.854%
52.0	1.067	0.092	1392.025	.006%	99.860%
53.0	1.009	0.088	1392.114	.006%	99.867%
54.0	0.963	0.085	1392.199	.006%	99.873%
55.0	0.928	0.083	1392.283	.005%	99.879%
56.0	0.876	0.080	1392.362	.005%	99.885%
57.0	0.812	0.075	1392.437	.005%	99.890%
58.0	0.754	0.070	1392.507	.005%	99.895%
59.0	0.742	0.070	1392.577	.005%	99.900%
60.0	0.684	0.065	1392.642	.004%	99.905%
61.0	0.655	0.063	1392.705	.004%	99.909%
62.0	0.621	0.060	1392.765	.004%	99.914%
63.0	0.586	0.057	1392.822	.004%	99.918%
64.0	0.574	0.057	1392.879	.004%	99.922%
65.0	0.539	0.054	1392.932	.003%	99.926%
66.0	0.505	0.051	1392.983	.003%	99.929%
67.0	0.476	0.048	1393.031	.003%	99.933%
68.0	0.470	0.048	1393.079	.003%	99.936%
69.0	0.441	0.045	1393.124	.003%	99.939%
70.0	0.435	0.045	1393.169	.003%	99.942%
71.0	0.418	0.043	1393.212	.003%	99.946%
72.0	0.394	0.041	1393.253	.003%	99.949%
73.0	0.400	0.042	1393.295	.003%	99.952%
74.0	0.360	0.038	1393.333	.002%	99.954%
75.0	0.365	0.039	1393.372	.002%	99.957%

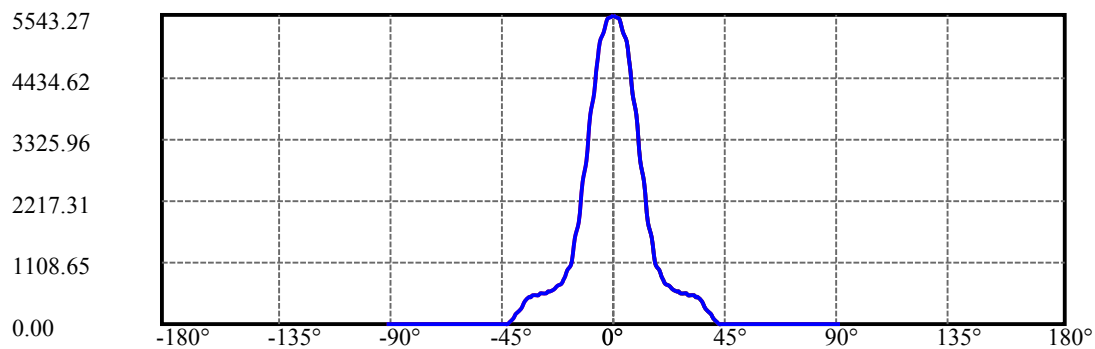
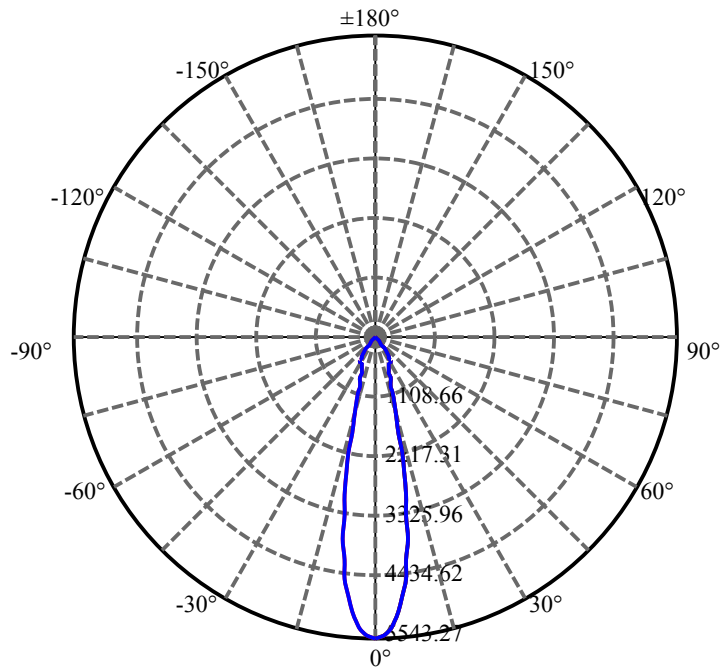
$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
76.0	0.365	0.039	1393.411	.003%	99.960%
77.0	0.348	0.037	1393.448	.002%	99.962%
78.0	0.348	0.037	1393.485	.002%	99.965%
79.0	0.348	0.037	1393.523	.002%	99.968%
80.0	0.354	0.038	1393.561	.002%	99.971%
81.0	0.354	0.038	1393.599	.002%	99.973%
82.0	0.325	0.035	1393.634	.002%	99.976%
83.0	0.331	0.036	1393.67	.002%	99.978%
84.0	0.342	0.037	1393.708	.002%	99.981%
85.0	0.348	0.038	1393.746	.002%	99.984%
86.0	0.365	0.040	1393.786	.003%	99.987%
87.0	0.400	0.044	1393.829	.003%	99.990%
88.0	0.557	0.061	1393.89	.004%	99.994%
89.0	0.528	0.058	1393.948	.004%	99.998%
90.0	0.406	0.022	1393.971	.001%	100.000%

ZONAL LUMEN SUMMARY

Zone	Lumens	%Lamp	%Fixt
0-30	1167.72	75.34%	83.77%
0-40	1386.22	89.43%	99.44%
0-60	1392.64	89.85%	99.90%
0-90	1393.95	89.93%	100.00%
0-120	1393.95	89.93%	100.00%
0-180	1393.97	89.93%	100.00%
60-90	1.37	0.09%	0.10%
90-120	0.00	0.00%	0.00%
90-130	0.00	0.00%	0.00%
90-150	0.00	0.00%	0.00%
90-180	0.00	0.00%	0.00%
0-28.17	1115.18	71.95%	80.00%

ZONAL LUMEN SUMMARY

0-10	458.04
10-20	429.45
20-30	280.23
30-40	218.50
40-50	5.62
50-60	0.81
60-70	0.53
70-80	0.39
80-90	0.39
90-100	0.00
100-110	0.00
110-120	0.00
120-130	0.00
130-140	0.00
140-150	0.00
150-160	0.00
160-170	0.00
170-180	0.00



C0(Max):

C0/C180:

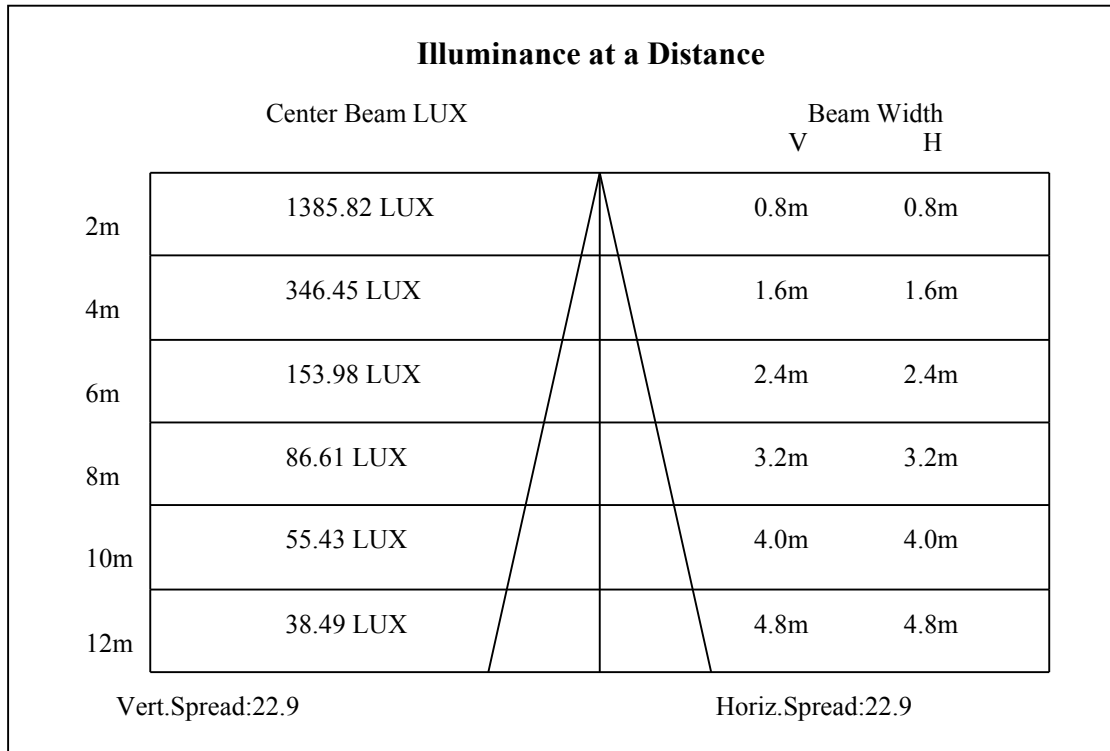
C90/C270:

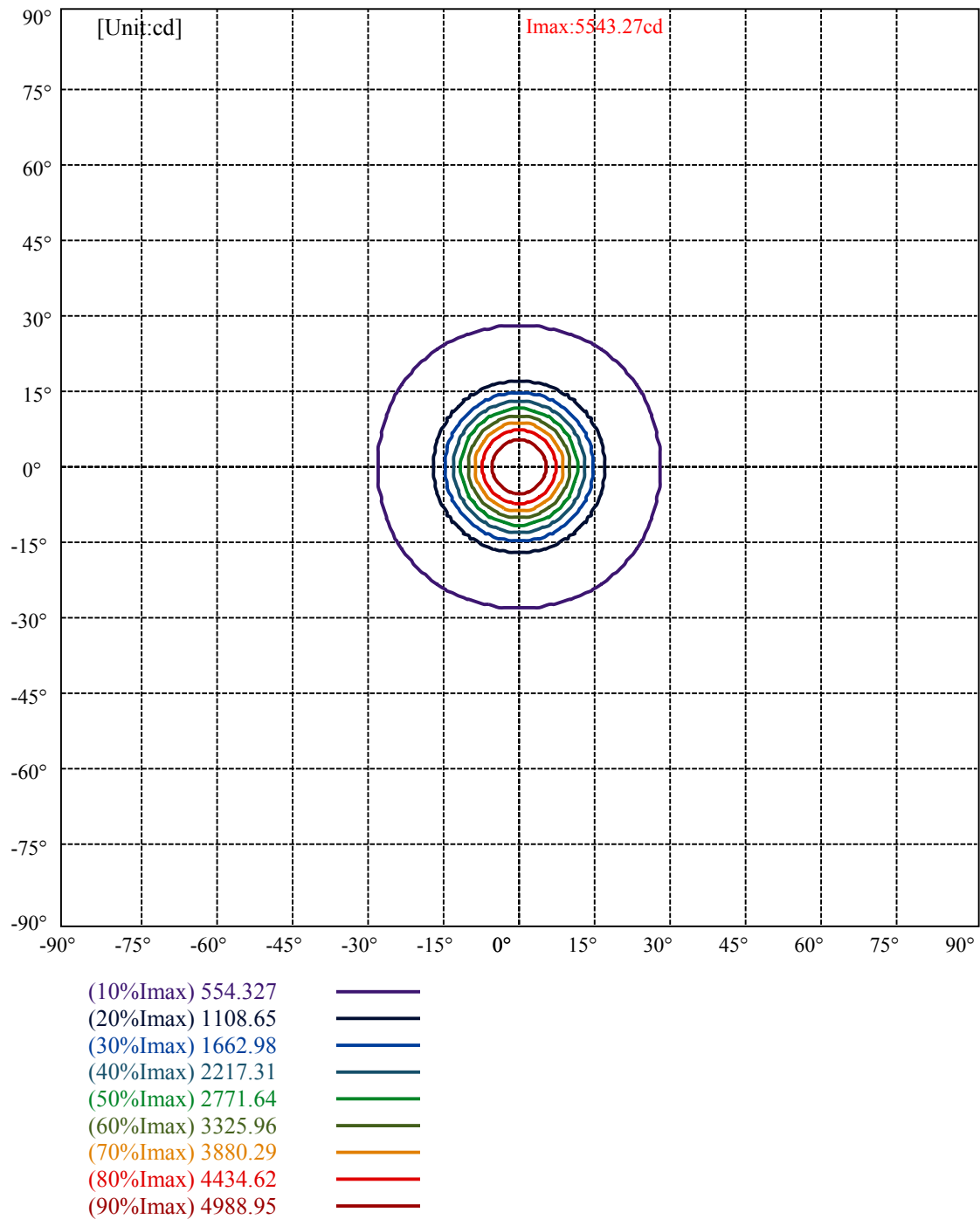
Field angle(10%Imax):C0/180Left:27.8 Right:27.8

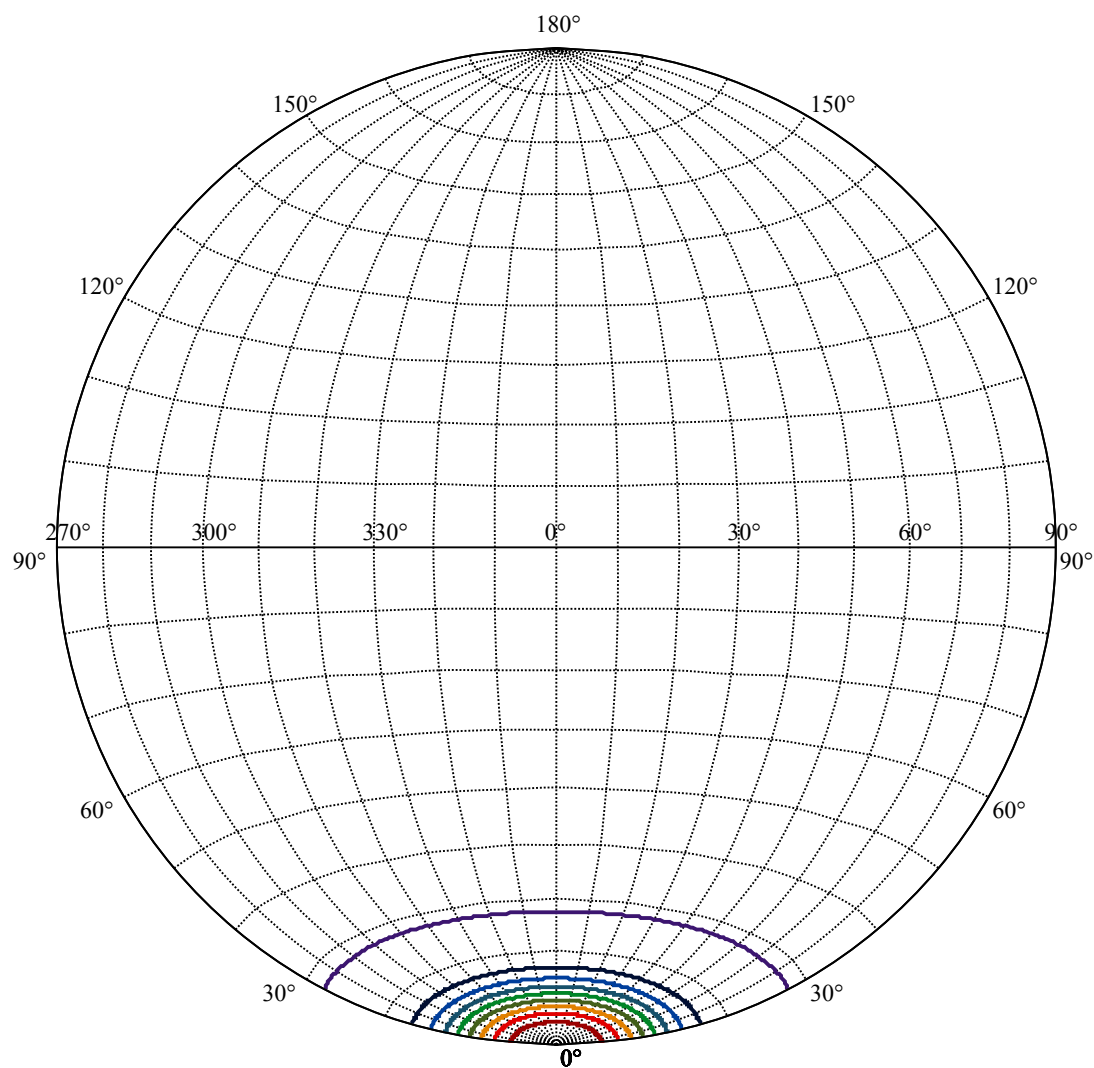
:C90/270Left:27.8 Right:27.8

Beam Angle(50%Imax):C0/180Left:11.4 Right:11.4

:C90/270Left:11.4 Right:11.4







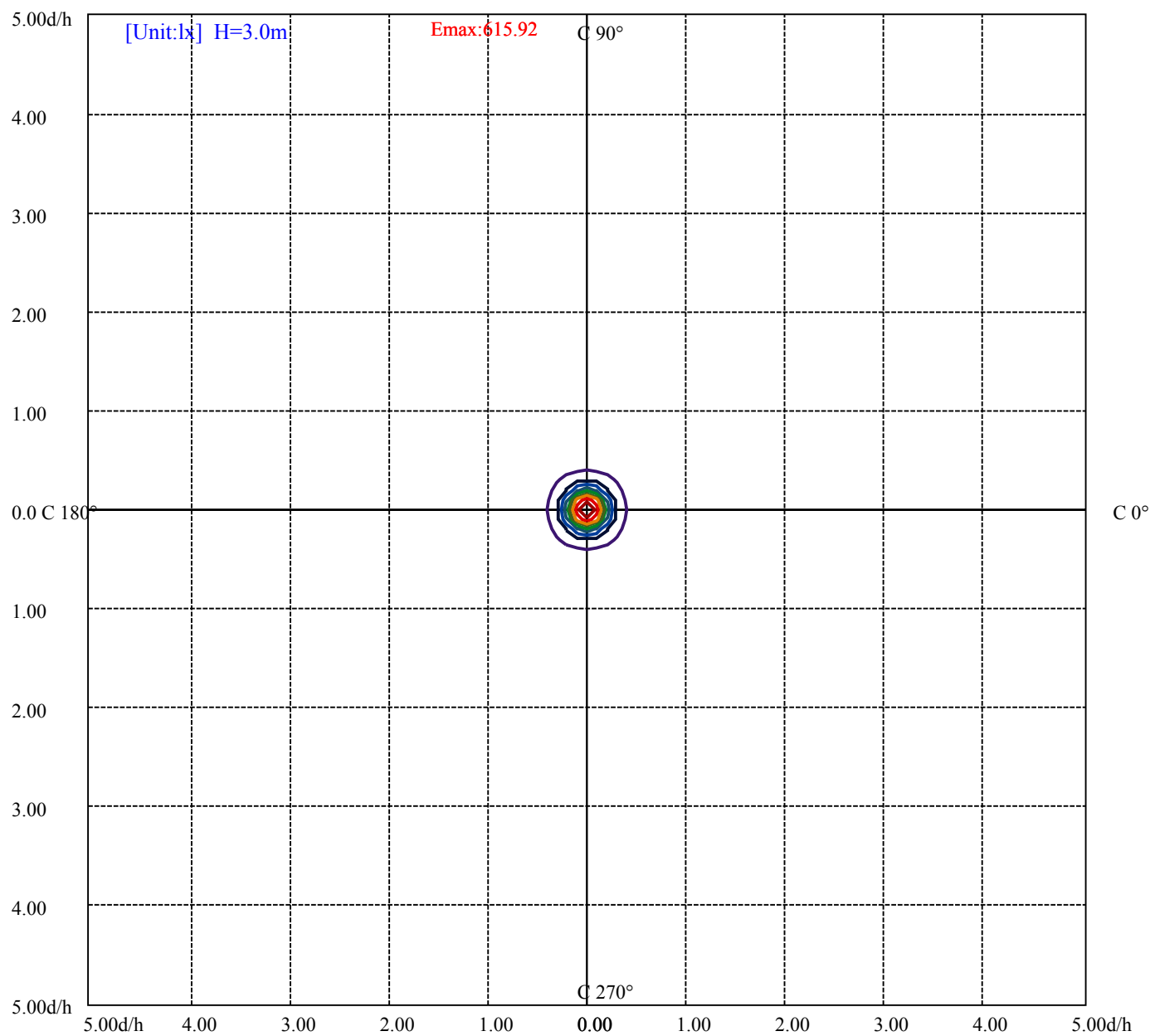
House

[Unit:cd]

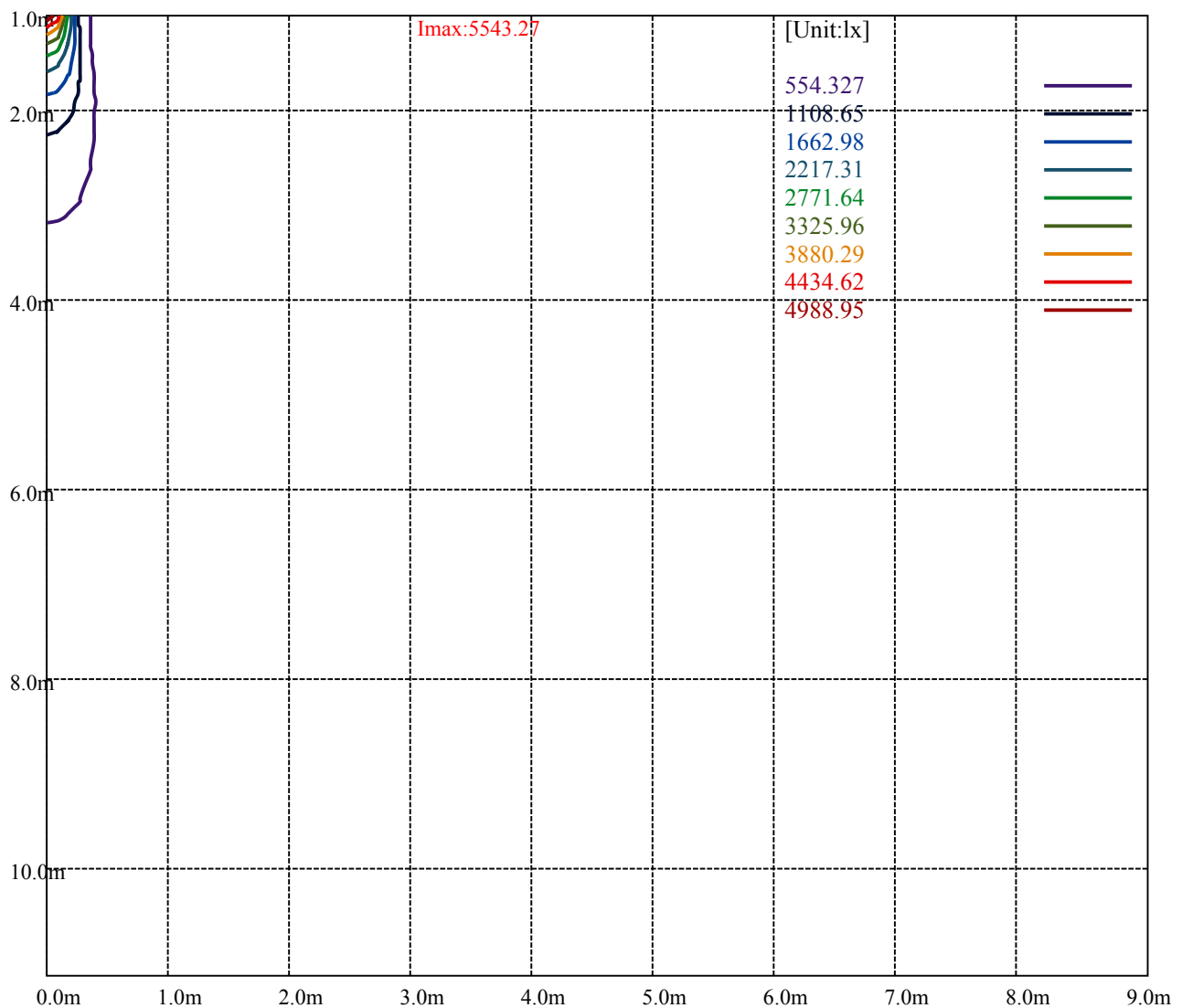
Road

Imax:5543.27

(10%Imax)	554.327	—
(20%Imax)	1108.65	—
(30%Imax)	1662.98	—
(40%Imax)	2217.31	—
(50%Imax)	2771.64	—
(60%Imax)	3325.96	—
(70%Imax)	3880.29	—
(80%Imax)	4434.62	—
(90%Imax)	4988.95	—



(10%E _{max}) 61.59189	—
(20%E _{max}) 123.1833	—
(30%E _{max}) 184.7756	—
(40%E _{max}) 246.3678	—
(50%E _{max}) 307.96	—
(60%E _{max}) 369.5511	—
(70%E _{max}) 431.1433	—
(80%E _{max}) 492.7356	—
(90%E _{max}) 554.3267	—



Luminance Table

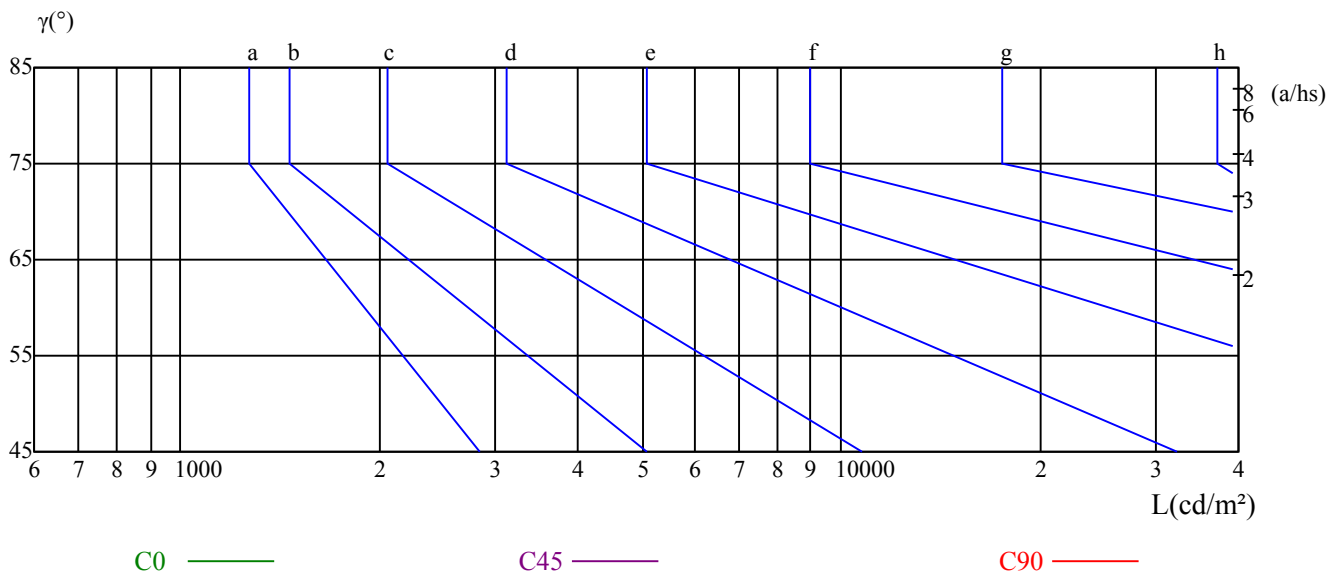
γ	45	50	55	60	65	70	75	80	85
C0	0	0	0	0	0	0	0	0	0
C45	0	0	0	0	0	0	0	0	0
C90	0	0	0	0	0	0	0	0	0

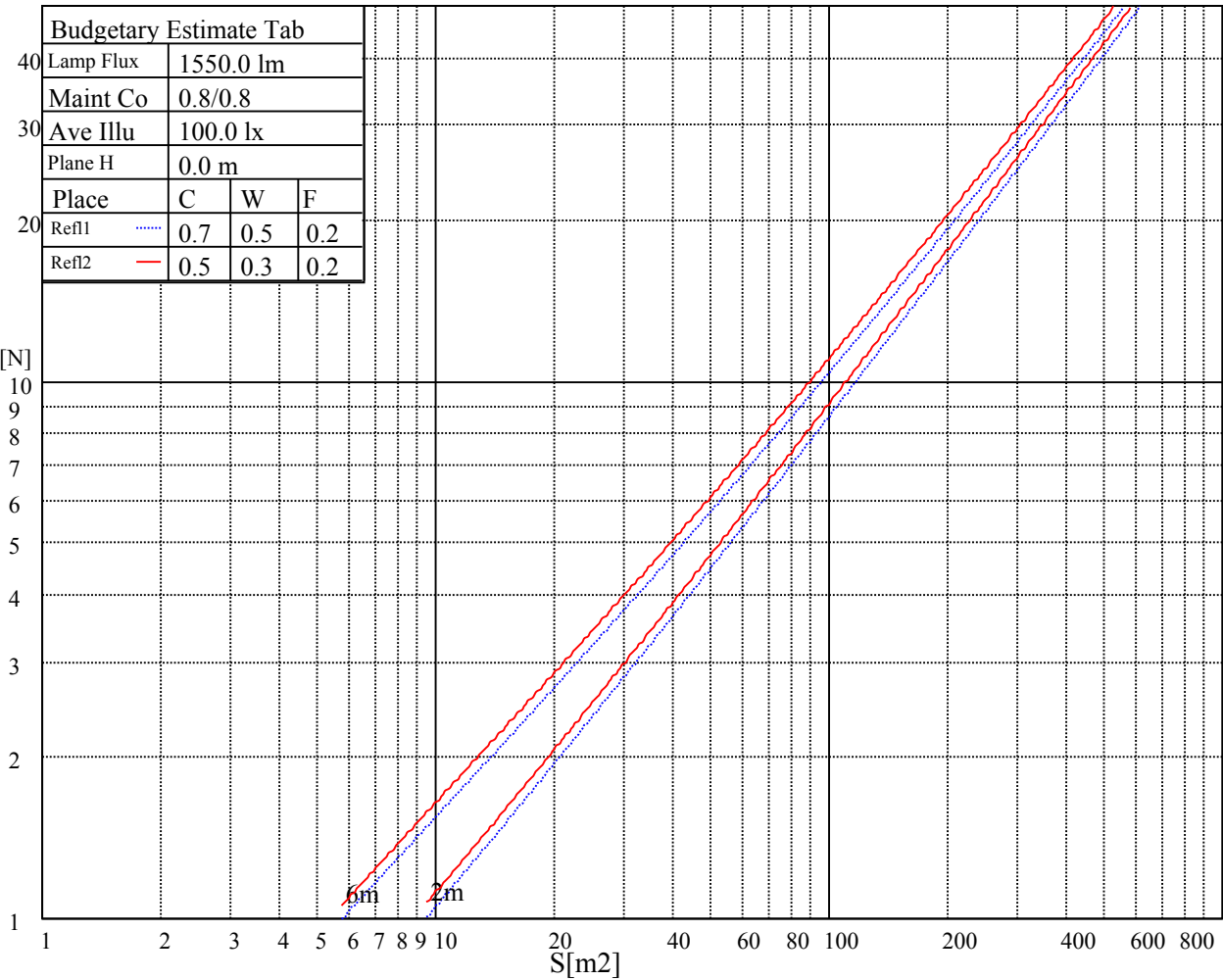
L(Hor)(65)	L(Ver)(65)	L45(65)	L(Hor)(75)	L(Ver)(75)	L45(75)	L(Hor)(85)	L(Ver)(85)	L45(85)
0	0	0	0	0	0	0	0	0

Glare Table

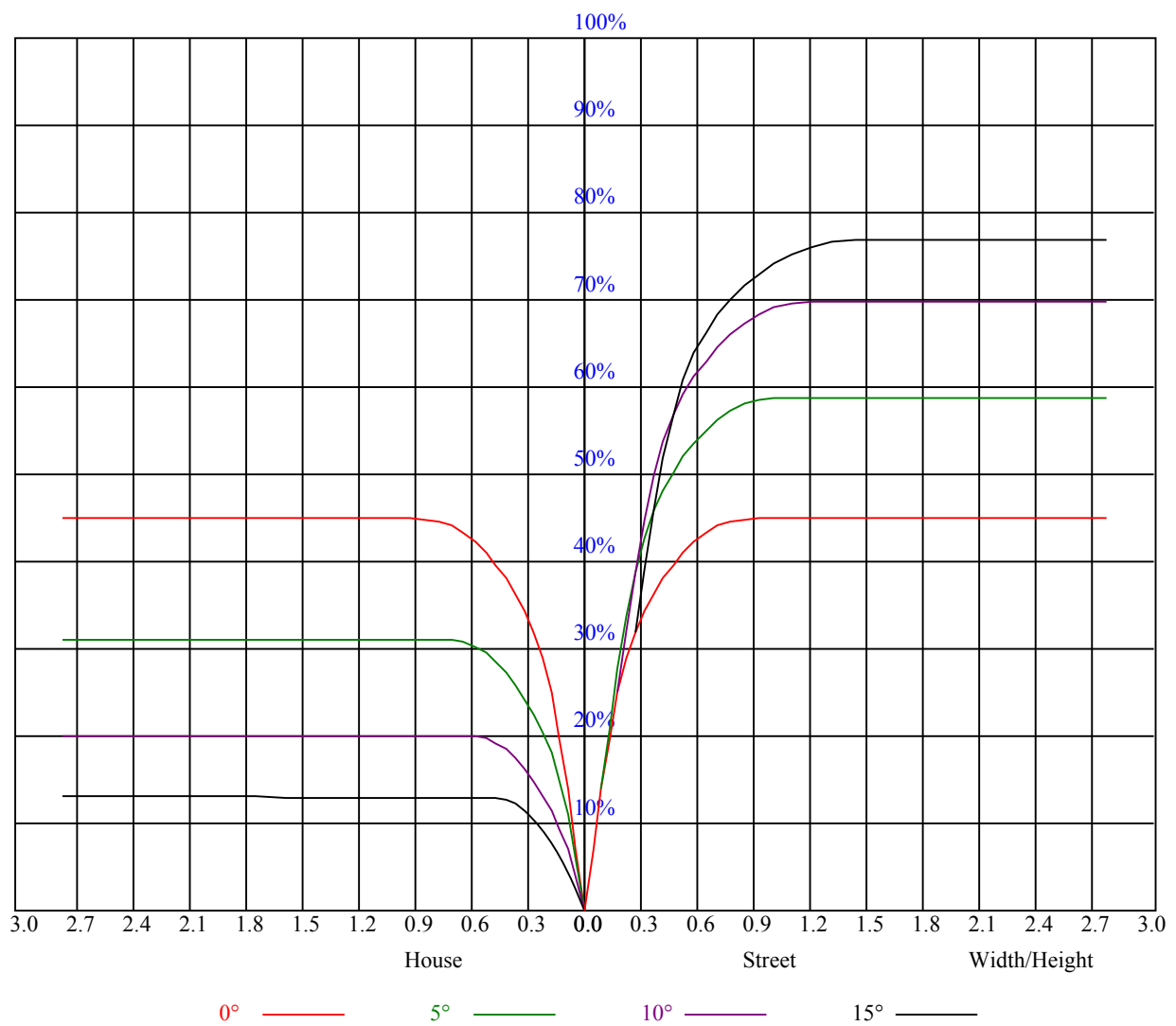
Glare	Quality	Service Values Illuminance(lx)							
1.15	A	2000	1000	500	≤ 300				
1.5	B		2000	1000	500	≤ 300			
1.85	C			2000	1000	500	≤ 300		
2.2	D				2000	1000	500	≤ 300	
2.55	E					2000	1000	500	≤ 300
		a	b	c	d	e	f	g	h

Luminance Limiting Curve





RHOCC	80			70			50			30			10			0
RHOW	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
RCR	COEFFICIENTS OF UTILIZATION RHOFC=20 CU															
0	1.07	1.07	1.07	1.05	1.05	1.05	1.00	1.00	1.00	0.96	0.96	0.96	0.92	0.92	0.92	0.90
1	1.01	0.99	0.97	0.99	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.88	0.86
2	0.96	0.93	0.90	0.94	0.91	0.89	0.91	0.89	0.87	0.89	0.87	0.85	0.86	0.85	0.84	0.82
3	0.91	0.87	0.84	0.90	0.86	0.84	0.87	0.85	0.82	0.85	0.83	0.81	0.83	0.82	0.80	0.79
4	0.87	0.83	0.80	0.86	0.82	0.79	0.84	0.81	0.78	0.82	0.80	0.77	0.81	0.78	0.77	0.75
5	0.83	0.79	0.76	0.82	0.78	0.75	0.81	0.77	0.75	0.79	0.76	0.74	0.78	0.75	0.74	0.72
6	0.79	0.75	0.72	0.79	0.75	0.72	0.78	0.74	0.72	0.76	0.73	0.71	0.75	0.73	0.71	0.70
7	0.76	0.72	0.69	0.76	0.72	0.69	0.75	0.71	0.69	0.74	0.71	0.68	0.73	0.70	0.68	0.67
8	0.73	0.69	0.66	0.73	0.69	0.66	0.72	0.69	0.66	0.71	0.68	0.66	0.71	0.68	0.66	0.65
9	0.71	0.67	0.64	0.70	0.67	0.64	0.70	0.66	0.64	0.69	0.66	0.63	0.68	0.65	0.63	0.62
10	0.68	0.64	0.62	0.68	0.64	0.62	0.67	0.64	0.61	0.67	0.64	0.61	0.66	0.63	0.61	0.60



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Intensity data(cd)									Appendix Page: 16 Total:18
C/γ(°)	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0
0.0	5531.33	5464.50	5367.52	5227.38	5024.60	4747.57	4422.75	4049.20	3651.53
45.0	5567.98	5545.71	5479.35	5428.31	5254.76	5137.36	4881.21	4569.38	4210.22
90.0	5543.85	5485.85	5392.11	5312.30	5037.59	4876.57	4423.21	4200.48	3802.34
135.0	5542.00	5566.59	5549.42	5495.59	5405.57	5274.71	5067.76	4787.02	4445.02
180.0	5531.33	5570.77	5555.45	5494.20	5410.21	5290.96	5100.24	4832.49	4495.14
225.0	5567.98	5526.68	5453.37	5367.99	5253.83	5067.76	4802.79	4466.37	4090.50
270.0	5543.85	5561.49	5510.91	5434.81	5338.75	5217.17	5040.38	4800.01	4489.57
315.0	5517.87	5477.50	5387.47	5275.64	5116.94	4891.89	4611.61	4276.11	3903.50
360.0	5531.33	5464.50	5367.52	5227.38	5024.60	4747.57	4422.75	4049.20	3651.53
C/γ(°)	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0
0.0	3243.18	2834.83	2441.33	2216.73	1871.03	1474.74	1336.46	1063.61	898.14
45.0	3817.19	3405.12	2988.42	2582.39	2199.10	1854.79	1559.20	1313.26	1118.83
90.0	3385.63	2957.33	2541.56	2148.06	1799.57	1506.76	1271.03	887.97	887.97
135.0	4063.59	3658.95	3238.54	2814.41	2410.24	2031.58	1700.26	1424.17	1201.89
180.0	4118.81	3720.20	3386.56	2886.33	2483.09	2179.15	1832.98	1535.07	1290.52
225.0	3693.29	3274.27	2855.24	2455.71	2081.24	1748.52	1471.96	1246.90	904.45
270.0	4132.26	3746.19	3333.20	2912.32	2502.58	2124.86	1792.14	1515.12	1333.68
315.0	3508.60	3092.83	2684.48	2290.98	1931.82	1625.56	1375.44	1172.66	872.34
360.0	3243.18	2834.83	2441.33	2216.73	1871.03	1474.74	1336.46	1063.61	898.14
C/γ(°)	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0
0.0	877.35	791.22	728.90	683.24	648.35	620.92	598.28	579.95	567.84
45.0	967.56	853.87	770.81	712.80	671.50	639.95	624.17	602.36	577.30
90.0	827.88	752.20	708.39	660.23	636.00	611.09	591.13	575.26	561.34
135.0	1028.34	897.49	801.43	734.15	704.45	651.55	633.92	610.25	583.34
180.0	1094.70	945.28	836.70	758.74	703.06	662.22	631.13	607.47	587.51
225.0	881.94	841.15	759.76	702.73	661.43	629.28	604.50	585.19	569.37
270.0	1142.96	966.63	877.07	792.15	722.08	686.82	652.01	623.71	600.51
315.0	872.34	816.61	745.24	694.01	656.00	626.68	602.64	583.57	568.12
360.0	877.35	791.22	728.90	683.24	648.35	620.92	598.28	579.95	567.84
C/γ(°)	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0
0.0	554.52	542.87	530.48	520.23	510.48	500.32	480.41	428.12	362.09
45.0	568.02	555.03	543.89	531.83	521.62	511.88	501.67	485.43	439.95
90.0	549.09	538.19	526.31	516.05	507.00	497.26	476.75	422.78	354.01
135.0	574.06	559.67	546.68	534.61	522.55	513.27	503.06	492.39	460.83
180.0	570.81	556.89	545.29	533.22	521.62	516.05	502.59	496.10	477.07
225.0	556.14	549.14	532.20	521.34	515.63	502.83	492.53	481.90	436.24
270.0	581.02	565.24	550.85	537.86	525.33	516.05	506.31	495.63	478.00
315.0	555.22	543.29	530.30	519.90	510.99	501.62	488.63	471.09	383.57
360.0	554.52	542.87	530.48	520.23	510.48	500.32	480.41	428.12	362.09
C/γ(°)	36.0	37.0	38.0	39.0	40.0	41.0	42.0	43.0	44.0
0.0	284.96	208.49	134.29	69.33	26.26	13.87	7.80	3.57	2.23
45.0	370.35	297.03	233.92	233.92	59.54	33.36	14.90	7.10	4.64
90.0	270.53	188.91	113.97	51.93	21.11	12.48	7.01	3.76	3.29
135.0	397.26	323.48	258.05	258.05	74.62	42.23	18.14	11.23	5.52
180.0	398.19	356.89	279.86	249.70	234.38	62.60	24.55	14.11	8.31
225.0	367.70	293.13	214.20	140.32	72.20	28.91	15.03	8.54	4.08
270.0	429.74	361.99	277.54	261.76	261.76	75.54	30.95	15.41	8.58
315.0	309.19	258.19	178.47	103.67	43.62	18.93	11.79	5.94	3.20
360.0	284.96	208.49	134.29	69.33	26.26	13.87	7.80	3.57	2.23

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Intensity data(cd)										Appendix Page: 17 Total:18	
C/γ(°)	45.0	46.0	47.0	48.0	49.0	50.0	51.0	52.0	53.0		
0.0	1.67	1.58	1.44	1.44	1.35	1.25	1.21	1.07	1.07		
45.0	2.92	1.58	1.48	1.48	1.35	1.21	1.21	1.16	1.07		
90.0	2.46	1.30	1.30	1.25	1.16	1.02	1.02	1.02	0.88		
135.0	2.83	1.62	1.48	1.39	1.35	1.30	1.16	1.11	1.07		
180.0	5.15	2.83	1.53	1.48	1.44	1.30	1.25	1.16	1.11		
225.0	3.11	1.48	1.39	1.25	1.11	1.16	1.11	0.97	0.93		
270.0	3.48	2.00	1.44	1.30	1.25	1.25	1.16	1.02	0.97		
315.0	2.74	1.44	1.30	1.25	1.21	1.07	0.97	1.02	0.97		
360.0	1.67	1.58	1.44	1.44	1.35	1.25	1.21	1.07	1.07		
C/γ(°)	54.0	55.0	56.0	57.0	58.0	59.0	60.0	61.0	62.0		
0.0	1.02	1.02	0.97	0.84	0.74	0.74	0.74	0.74	0.60		
45.0	0.97	0.97	0.93	0.84	0.74	0.79	0.70	0.65	0.60		
90.0	0.79	0.79	0.84	0.74	0.65	0.70	0.65	0.60	0.60		
135.0	1.02	0.93	0.88	0.88	0.84	0.74	0.70	0.70	0.70		
180.0	1.11	1.02	0.93	0.88	0.88	0.84	0.74	0.70	0.74		
225.0	0.93	0.93	0.79	0.74	0.70	0.79	0.65	0.56	0.60		
270.0	0.97	0.93	0.84	0.79	0.74	0.74	0.70	0.65	0.56		
315.0	0.88	0.84	0.84	0.79	0.74	0.60	0.60	0.65	0.56		
360.0	1.02	1.02	0.97	0.84	0.74	0.74	0.74	0.74	0.60		
C/γ(°)	63.0	64.0	65.0	66.0	67.0	68.0	69.0	70.0	71.0		
0.0	0.60	0.65	0.60	0.51	0.51	0.56	0.42	0.46	0.51		
45.0	0.60	0.60	0.60	0.56	0.46	0.46	0.51	0.46	0.37		
90.0	0.46	0.46	0.42	0.46	0.46	0.42	0.37	0.37	0.42		
135.0	0.65	0.65	0.56	0.46	0.46	0.46	0.46	0.42	0.42		
180.0	0.70	0.60	0.56	0.60	0.60	0.51	0.46	0.51	0.56		
225.0	0.56	0.51	0.46	0.51	0.46	0.42	0.37	0.42	0.42		
270.0	0.60	0.60	0.56	0.51	0.46	0.51	0.46	0.42	0.37		
315.0	0.51	0.51	0.56	0.42	0.37	0.42	0.46	0.42	0.28		
360.0	0.60	0.65	0.60	0.51	0.51	0.56	0.42	0.46	0.51		
C/γ(°)	72.0	73.0	74.0	75.0	76.0	77.0	78.0	79.0	80.0		
0.0	0.42	0.37	0.42	0.46	0.42	0.37	0.37	0.42	0.42		
45.0	0.37	0.42	0.42	0.32	0.32	0.37	0.37	0.32	0.32		
90.0	0.37	0.32	0.28	0.32	0.37	0.28	0.28	0.28	0.37		
135.0	0.46	0.42	0.32	0.37	0.42	0.37	0.28	0.32	0.37		
180.0	0.46	0.51	0.46	0.46	0.42	0.46	0.51	0.42	0.37		
225.0	0.32	0.37	0.32	0.37	0.32	0.32	0.37	0.32	0.32		
270.0	0.37	0.42	0.37	0.32	0.32	0.28	0.32	0.37	0.32		
315.0	0.37	0.37	0.28	0.28	0.32	0.32	0.28	0.32	0.32		
360.0	0.42	0.37	0.42	0.46	0.42	0.37	0.37	0.42	0.42		
C/γ(°)	81.0	82.0	83.0	84.0	85.0	86.0	87.0	88.0	89.0		
0.0	0.37	0.42	0.37	0.46	0.42	0.46	0.74	1.21	0.79		
45.0	0.37	0.32	0.37	0.32	0.37	0.37	0.37	0.97	0.79		
90.0	0.32	0.23	0.28	0.28	0.28	0.37	0.42	0.46	0.32		
135.0	0.32	0.28	0.32	0.23	0.28	0.32	0.28	0.32	0.60		
180.0	0.46	0.42	0.46	0.51	0.51	0.56	0.56	0.60	0.74		
225.0	0.32	0.32	0.28	0.32	0.23	0.28	0.28	0.28	0.32		
270.0	0.37	0.37	0.28	0.32	0.37	0.23	0.28	0.28	0.28		
315.0	0.28	0.23	0.28	0.28	0.32	0.32	0.28	0.32	0.37		
360.0	0.37	0.42	0.37	0.46	0.42	0.46	0.74	1.21	0.79		

Intensity data(cd)

Appendix Page: 18 Total:18

C/ $\gamma(^{\circ})$	90.0
0.0	0.60
45.0	0.42
90.0	0.28
135.0	0.28
180.0	0.65
225.0	0.32
270.0	0.37
315.0	0.32
360.0	0.60