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## Nata

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### Client:

LumCAT: 3-2324-M

Luminaire: 92.70.131.00

Report No: GC2019091909

Test No: NATA07

LampCAT: OSRAM OPTO SOLERIQ S13

Lamp flux(lm): 1204.0

Number of Lamps: 1

Length(mm): 78

Phm Type: C

Voltage(V): 220.5000

Current(A): 0.0720

Power (W): 14.6700

PF: 0.9220

Ballast type: AC

Width(mm): 78

Height(mm): 0

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## Photometric Results

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Lumens(lm): 1055.79, Efficiency(%): 87.69% , Luminous Efficacy(lm/W): 71.97

Central intensity(cd): 5038.985, Maximum intensity(cd): 5038.985

Angle of maximum intensity: C=0.0  $\gamma$ =0.0

Beam Angle(50%Imax): [C0/180]Total=21.2

[C90/270]Total=21.2

Field angle(10%Imax): [C0/180]Total=42.4

[C90/270]Total=42.4

Maximum s/h(1/2): C0\_180=0.36 C90\_270=0.36

Maximum s/h(1/4): C0\_180=0.35 C90\_270=0.35

Up flux rate of lamp(%): 0.00%

Down flux rate of lamp(%): 87.69%

Up flux rate of LUM(%): - -

Down flux rate of LUM(%): 100.00%

CIE Type : Direct lighting

Output flux ratio in  $\pi$  solid angle : 99.593%

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	5038.986	0.000	0	.000%	.000%
1.0	5017.408	4.812	4.812	.400%	.456%
2.0	4952.791	14.310	19.122	1.189%	1.811%
3.0	4845.484	23.434	42.556	1.946%	4.031%
4.0	4685.160	31.902	74.458	2.650%	7.052%
5.0	4501.171	39.519	113.977	3.282%	10.795%
6.0	4225.361	45.860	159.838	3.809%	15.139%
7.0	3920.897	50.564	210.401	4.200%	19.928%
8.0	3569.218	53.605	264.007	4.452%	25.006%
9.0	3154.314	54.491	318.497	4.526%	30.167%
10.0	2758.609	53.510	372.007	4.444%	35.235%
11.0	2353.044	51.076	423.083	4.242%	40.073%
12.0	1944.811	46.982	470.065	3.902%	44.523%
13.0	1633.212	42.462	512.527	3.527%	48.544%
14.0	1328.644	37.911	550.438	3.149%	52.135%
15.0	1094.266	33.263	583.701	2.763%	55.286%
16.0	911.565	29.391	613.092	2.441%	58.070%
17.0	805.347	26.737	639.829	2.221%	60.602%
18.0	702.152	24.855	664.684	2.064%	62.956%
19.0	619.160	22.988	687.673	1.909%	65.134%
20.0	557.461	21.535	709.208	1.789%	67.173%
21.0	511.527	20.527	729.735	1.705%	69.118%
22.0	478.070	19.886	749.621	1.652%	71.001%
23.0	453.308	19.543	769.164	1.623%	72.852%
24.0	435.449	19.431	788.595	1.614%	74.693%
25.0	421.139	19.477	808.072	1.618%	76.537%
26.0	410.554	19.632	827.704	1.631%	78.397%
27.0	400.409	19.840	847.545	1.648%	80.276%
28.0	392.329	20.070	867.615	1.667%	82.177%
29.0	385.368	20.347	887.962	1.690%	84.104%
30.0	375.420	20.541	908.503	1.706%	86.050%
31.0	364.707	20.597	929.1	1.711%	88.001%
32.0	345.995	20.361	949.461	1.691%	89.929%
33.0	318.397	19.573	969.034	1.626%	91.783%
34.0	278.919	18.077	987.11	1.501%	93.495%
35.0	246.048	16.304	1003.414	1.354%	95.039%
36.0	191.785	13.941	1017.355	1.158%	96.360%
37.0	142.824	10.913	1028.268	.906%	97.393%

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
38.0	93.427	7.886	1036.153	.655%	98.140%
39.0	61.960	5.304	1041.457	.441%	98.643%
40.0	28.671	3.161	1044.618	.263%	98.942%
41.0	16.357	1.603	1046.221	.133%	99.094%
42.0	8.063	0.887	1047.109	.074%	99.178%
43.0	5.847	0.515	1047.624	.043%	99.227%
44.0	4.693	0.398	1048.022	.033%	99.264%
45.0	3.857	0.329	1048.35	.027%	99.296%
46.0	3.347	0.282	1048.632	.023%	99.322%
47.0	3.039	0.254	1048.886	.021%	99.346%
48.0	2.842	0.238	1049.124	.020%	99.369%
49.0	2.691	0.227	1049.351	.019%	99.390%
50.0	2.564	0.219	1049.57	.018%	99.411%
51.0	2.471	0.213	1049.783	.018%	99.431%
52.0	2.401	0.209	1049.992	.017%	99.451%
53.0	2.309	0.205	1050.197	.017%	99.470%
54.0	2.268	0.202	1050.399	.017%	99.490%
55.0	2.106	0.195	1050.594	.016%	99.508%
56.0	2.059	0.188	1050.782	.016%	99.526%
57.0	1.966	0.184	1050.966	.015%	99.543%
58.0	1.914	0.179	1051.146	.015%	99.560%
59.0	1.862	0.177	1051.322	.015%	99.577%
60.0	1.792	0.173	1051.495	.014%	99.593%
61.0	1.734	0.168	1051.663	.014%	99.609%
62.0	1.694	0.165	1051.828	.014%	99.625%
63.0	1.653	0.163	1051.991	.014%	99.640%
64.0	1.595	0.159	1052.151	.013%	99.655%
65.0	1.549	0.156	1052.306	.013%	99.670%
66.0	1.531	0.154	1052.46	.013%	99.685%
67.0	1.508	0.153	1052.613	.013%	99.699%
68.0	1.444	0.150	1052.762	.012%	99.713%
69.0	1.415	0.146	1052.908	.012%	99.727%
70.0	1.462	0.148	1053.056	.012%	99.741%
71.0	1.410	0.148	1053.204	.012%	99.755%
72.0	1.363	0.144	1053.348	.012%	99.769%
73.0	1.311	0.140	1053.488	.012%	99.782%
74.0	1.311	0.138	1053.626	.011%	99.795%
75.0	1.311	0.139	1053.765	.012%	99.808%

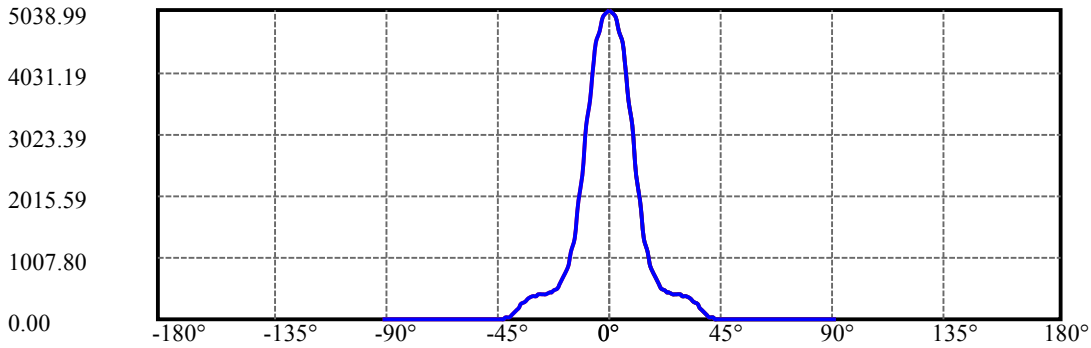
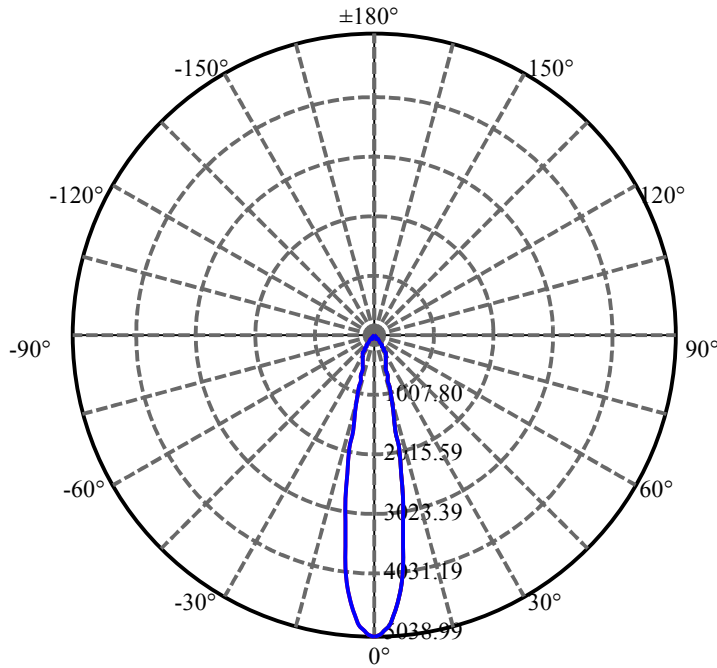
$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
76.0	1.276	0.137	1053.902	.011%	99.821%
77.0	1.276	0.136	1054.038	.011%	99.834%
78.0	1.253	0.135	1054.173	.011%	99.847%
79.0	1.247	0.134	1054.308	.011%	99.860%
80.0	1.241	0.134	1054.442	.011%	99.872%
81.0	1.235	0.134	1054.576	.011%	99.885%
82.0	1.206	0.132	1054.708	.011%	99.898%
83.0	1.224	0.132	1054.84	.011%	99.910%
84.0	1.201	0.132	1054.972	.011%	99.923%
85.0	1.230	0.133	1055.105	.011%	99.935%
86.0	1.212	0.133	1055.239	.011%	99.948%
87.0	1.235	0.134	1055.373	.011%	99.961%
88.0	1.259	0.137	1055.509	.011%	99.974%
89.0	1.270	0.139	1055.648	.012%	99.987%
90.0	1.288	0.140	1055.788	.012%	100.000%

ZONAL LUMEN SUMMARY

Zone	Lumens	%Lamp	%Fixt
0-30	908.50	75.46%	86.05%
0-40	1044.62	86.76%	98.94%
0-60	1051.49	87.33%	99.59%
0-90	1055.65	87.68%	99.99%
0-120	1055.65	87.68%	99.99%
0-180	1055.79	87.69%	100.00%
60-90	4.33	0.36%	0.41%
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%
0-26.85	844.63	70.15%	80.00%

ZONAL LUMEN SUMMARY

0-10	372.01
10-20	337.20
20-30	199.30
30-40	136.11
40-50	4.95
50-60	1.92
60-70	1.56
70-80	1.39
80-90	1.21
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: ———

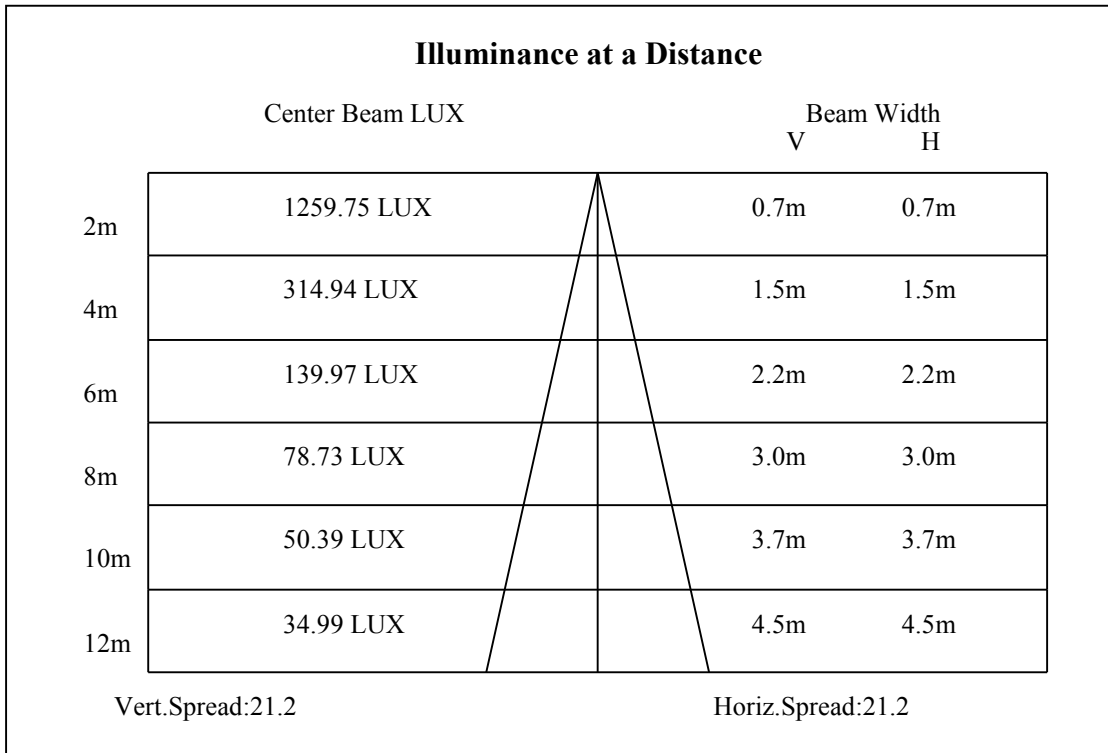
C90/C270: ———

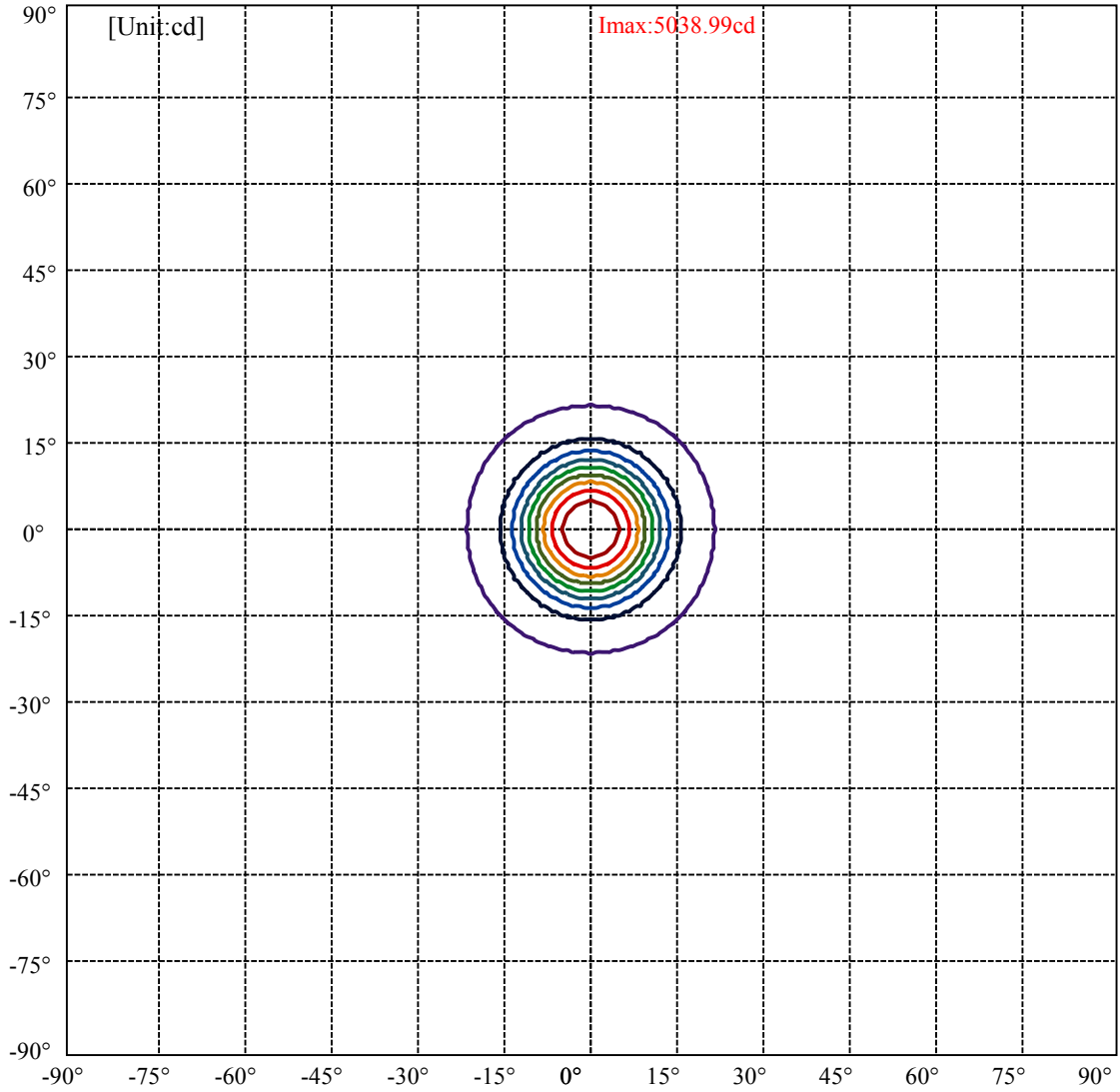
Field angle(10%Imax):C0/180Left:21.2 Right:21.2

:C90/270Left:21.2 Right:21.2

Beam Angle(50%Imax):C0/180Left:10.6 Right:10.6

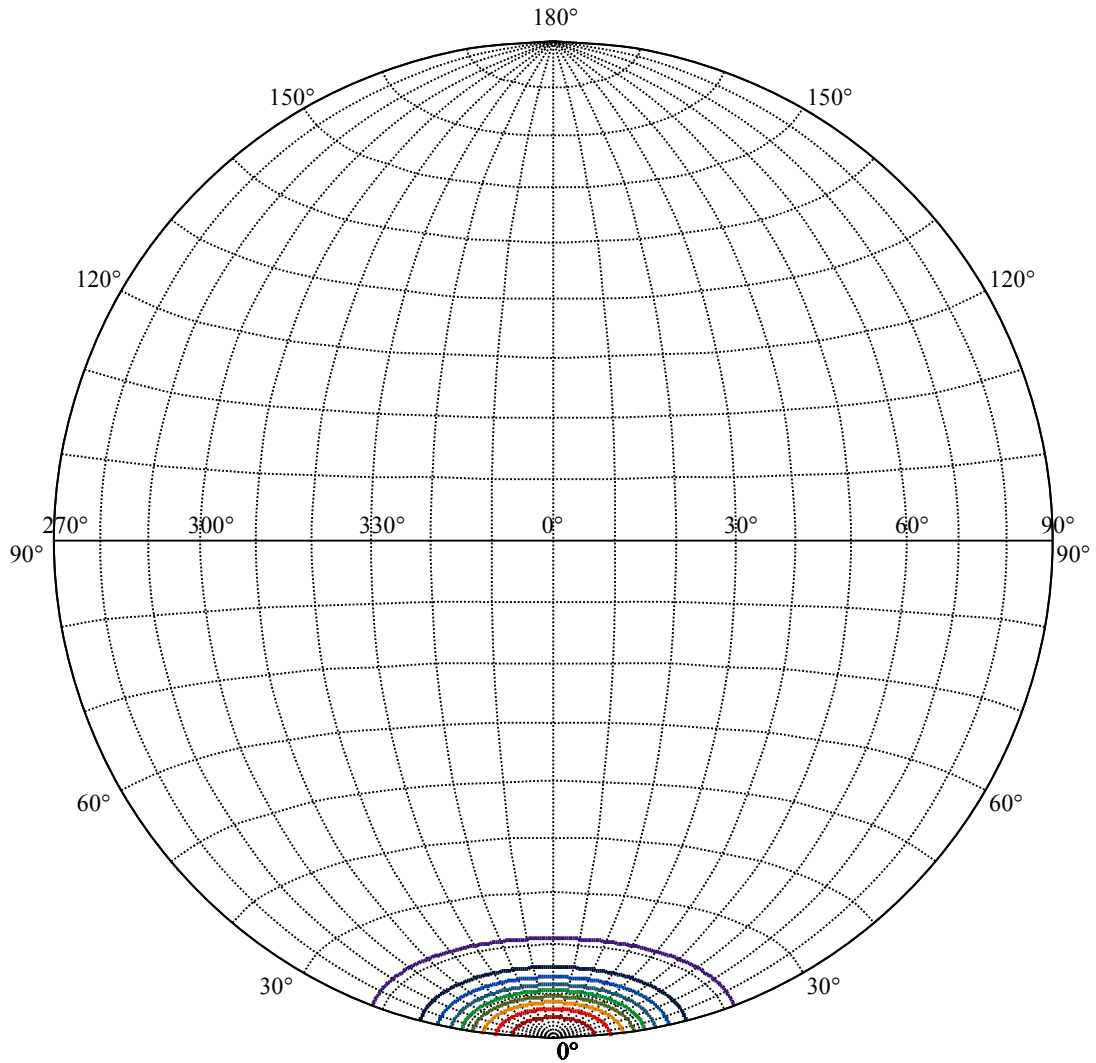
:C90/270Left:10.6 Right:10.6





(10%Imax) 503.899	—
(20%Imax) 1007.8	—
(30%Imax) 1511.7	—
(40%Imax) 2015.59	—
(50%Imax) 2519.49	—
(60%Imax) 3023.39	—
(70%Imax) 3527.29	—
(80%Imax) 4031.19	—
(90%Imax) 4535.09	—





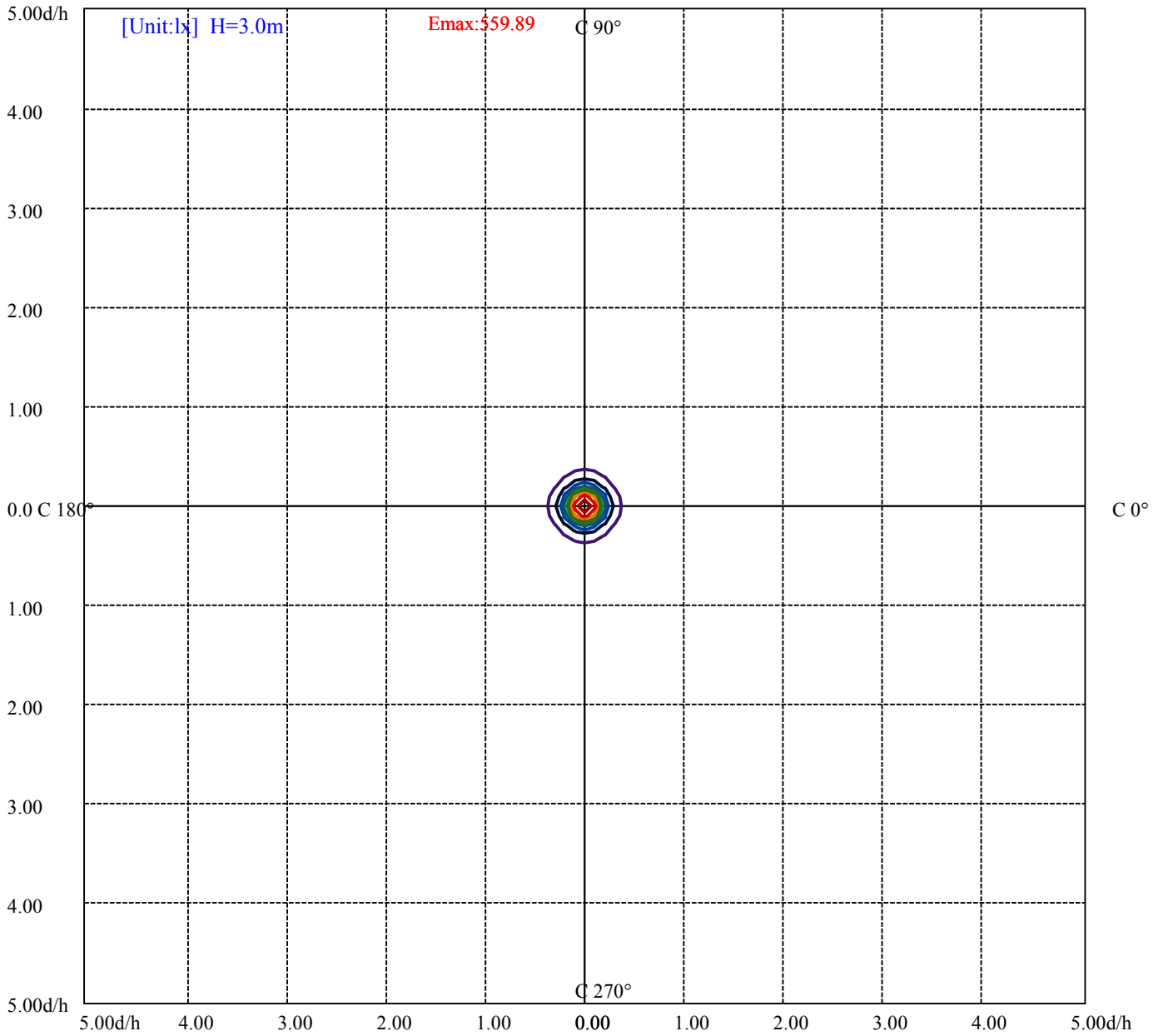
House

[Unit:cd]

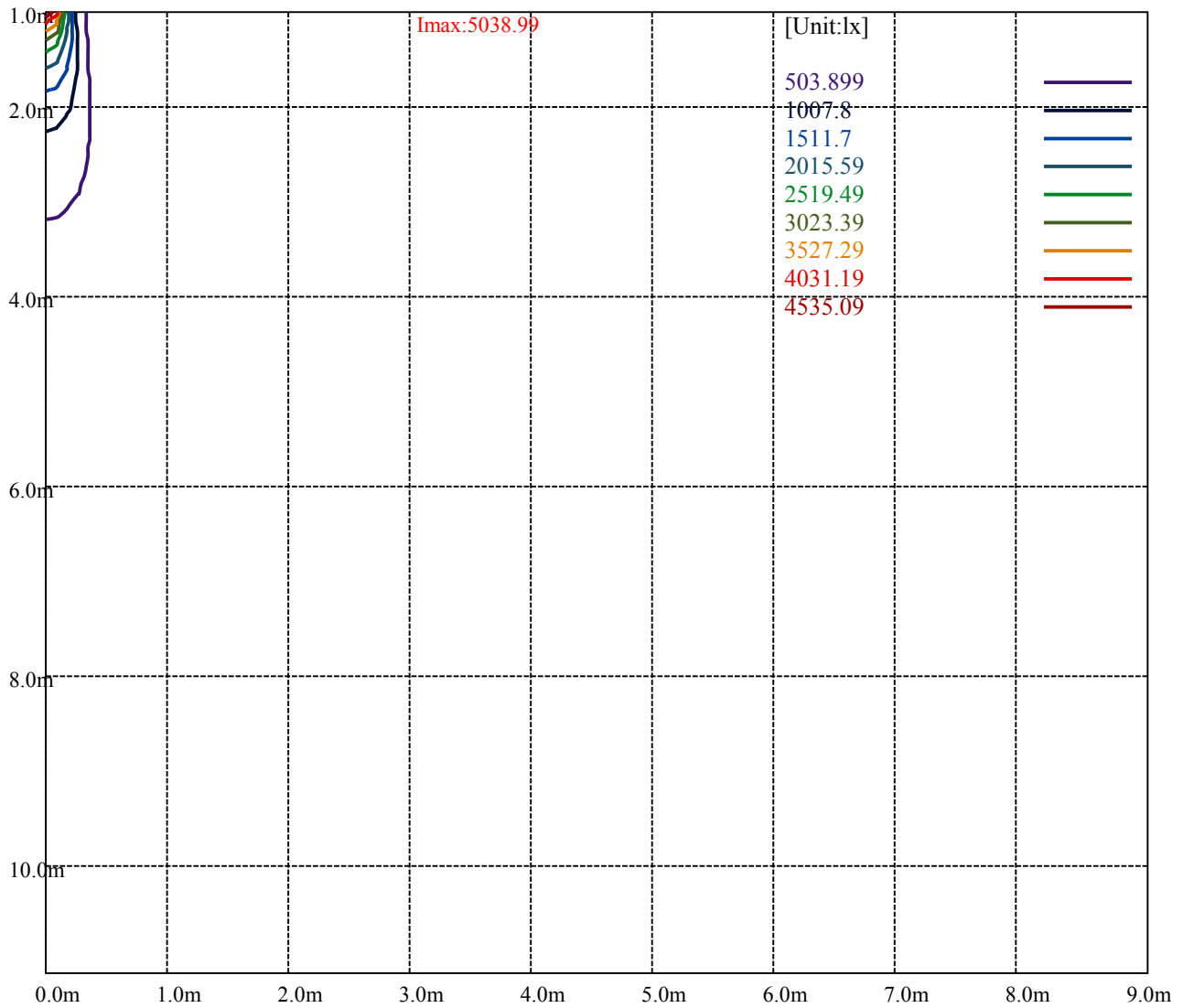
Road

Imax:5038.99

(10%Imax) 503.899	—
(20%Imax) 1007.8	—
(30%Imax) 1511.7	—
(40%Imax) 2015.59	—
(50%Imax) 2519.49	—
(60%Imax) 3023.39	—
(70%Imax) 3527.29	—
(80%Imax) 4031.19	—
(90%Imax) 4535.09	—



- (10%Emax) 55.98867
- (20%Emax) 111.9778
- (30%Emax) 167.9655
- (40%Emax) 223.9544
- (50%Emax) 279.9433
- (60%Emax) 335.9322
- (70%Emax) 391.9211
- (80%Emax) 447.91
- (90%Emax) 503.8978



Luminance Table

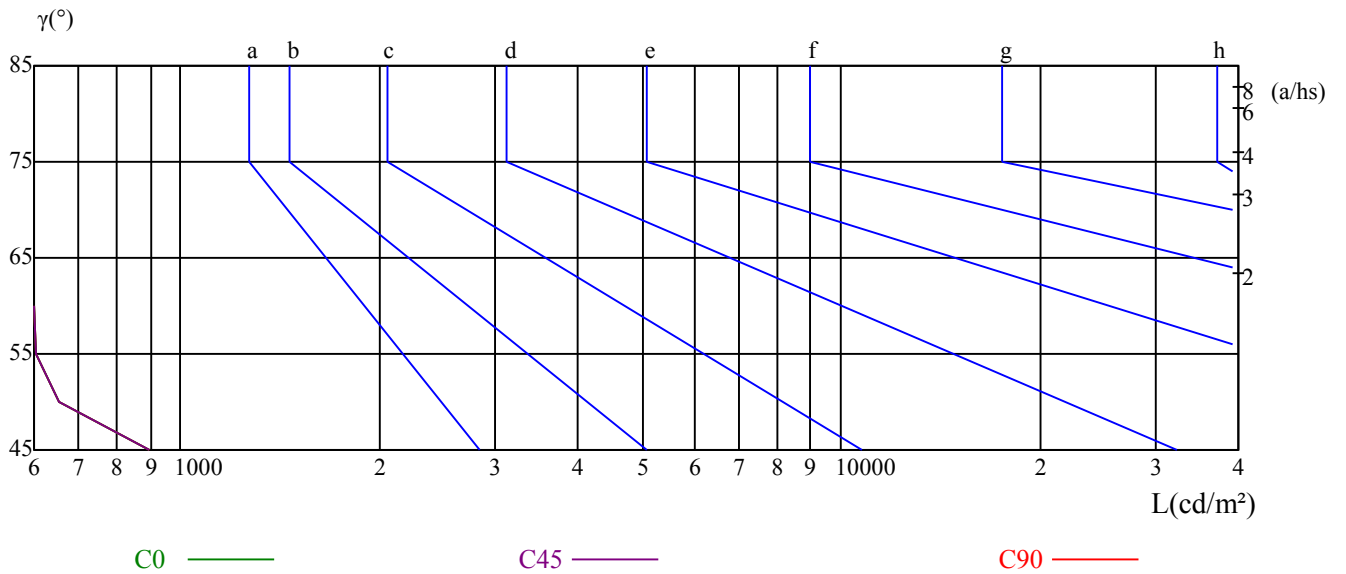
$\gamma$	45	50	55	60	65	70	75	80	85
C0	897	656	603	589	602	702	832	1175	2319
C45	897	656	603	589	602	702	832	1175	2319
C90	897	656	603	589	602	702	832	1175	2319

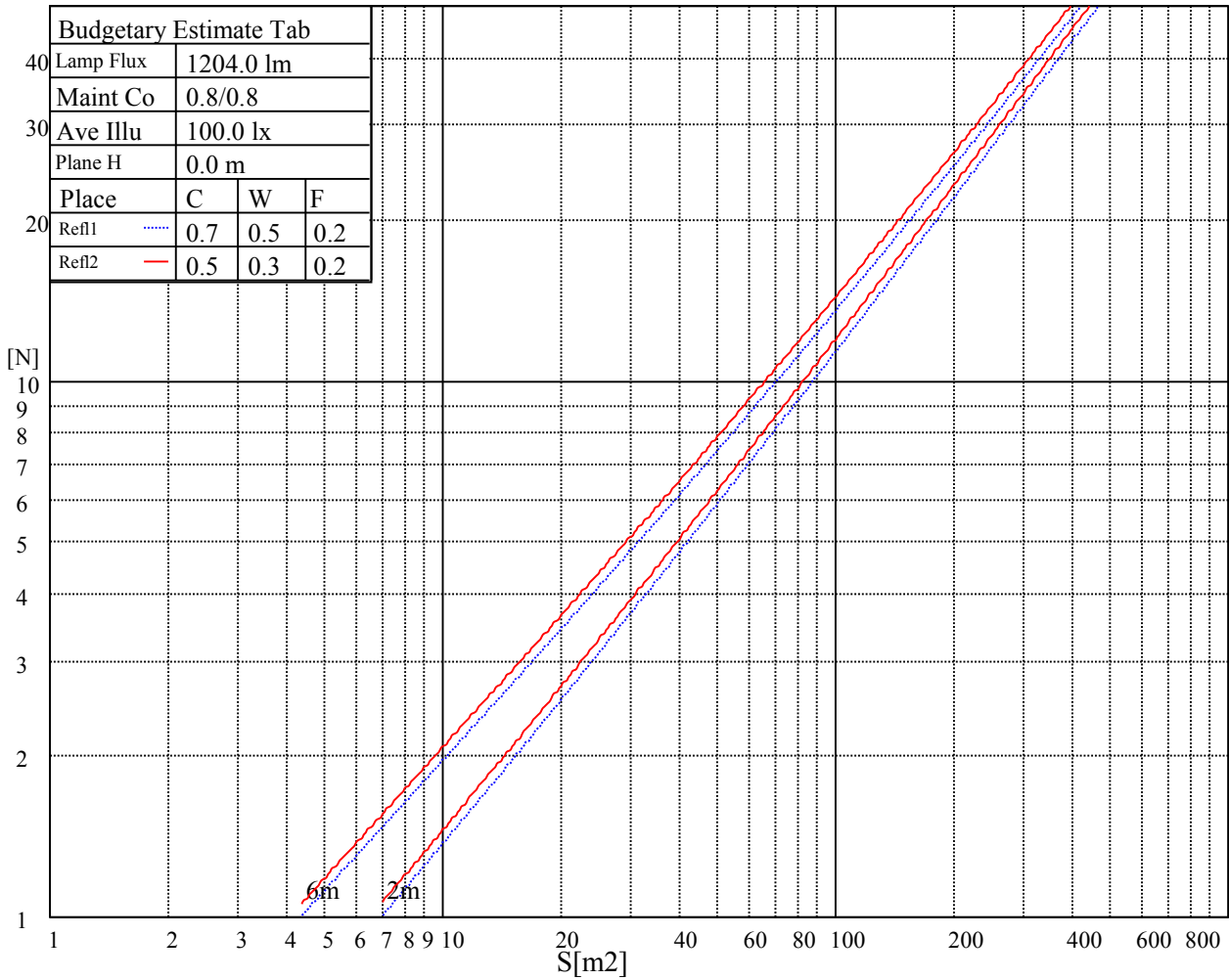
L(Hor)(65)	L(Ver)(65)	L45(65)	L(Hor)(75)	L(Ver)(75)	L45(75)	L(Hor)(85)	L(Ver)(85)	L45(85)
602	602	602	832	832	832	2319	2319	2319

Glare Table

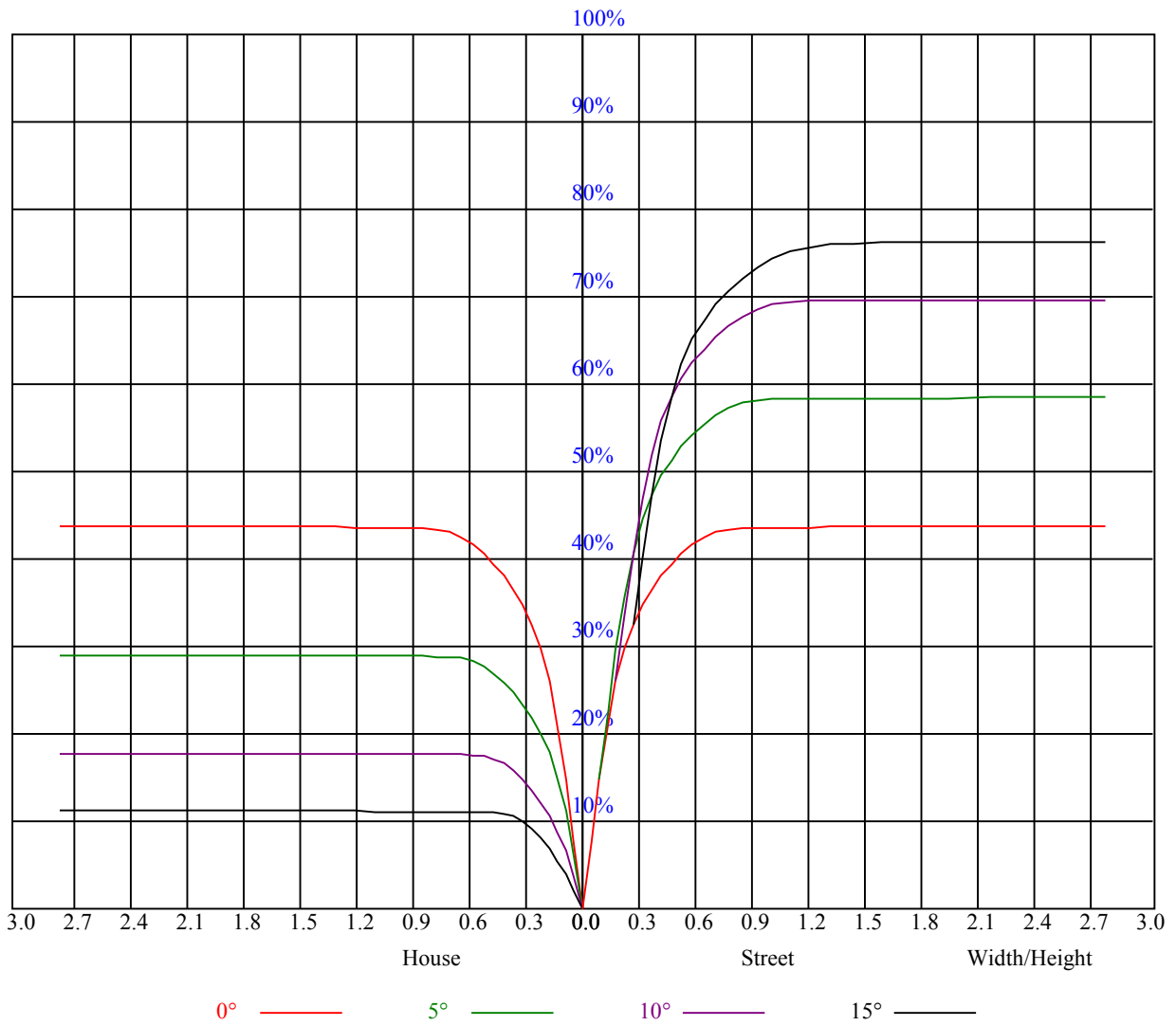
Glare	Quality	Service Values Illuminance(lx)							
1.15	A	2000	1000	500	<=300				
1.5	B		2000	1000	500	<=300			
1.85	C			2000	1000	500	<=300		
2.2	D				2000	1000	500	<=300	
2.55	E					2000	1000	500	<=300
		a	b	c	d	e	f	g	h

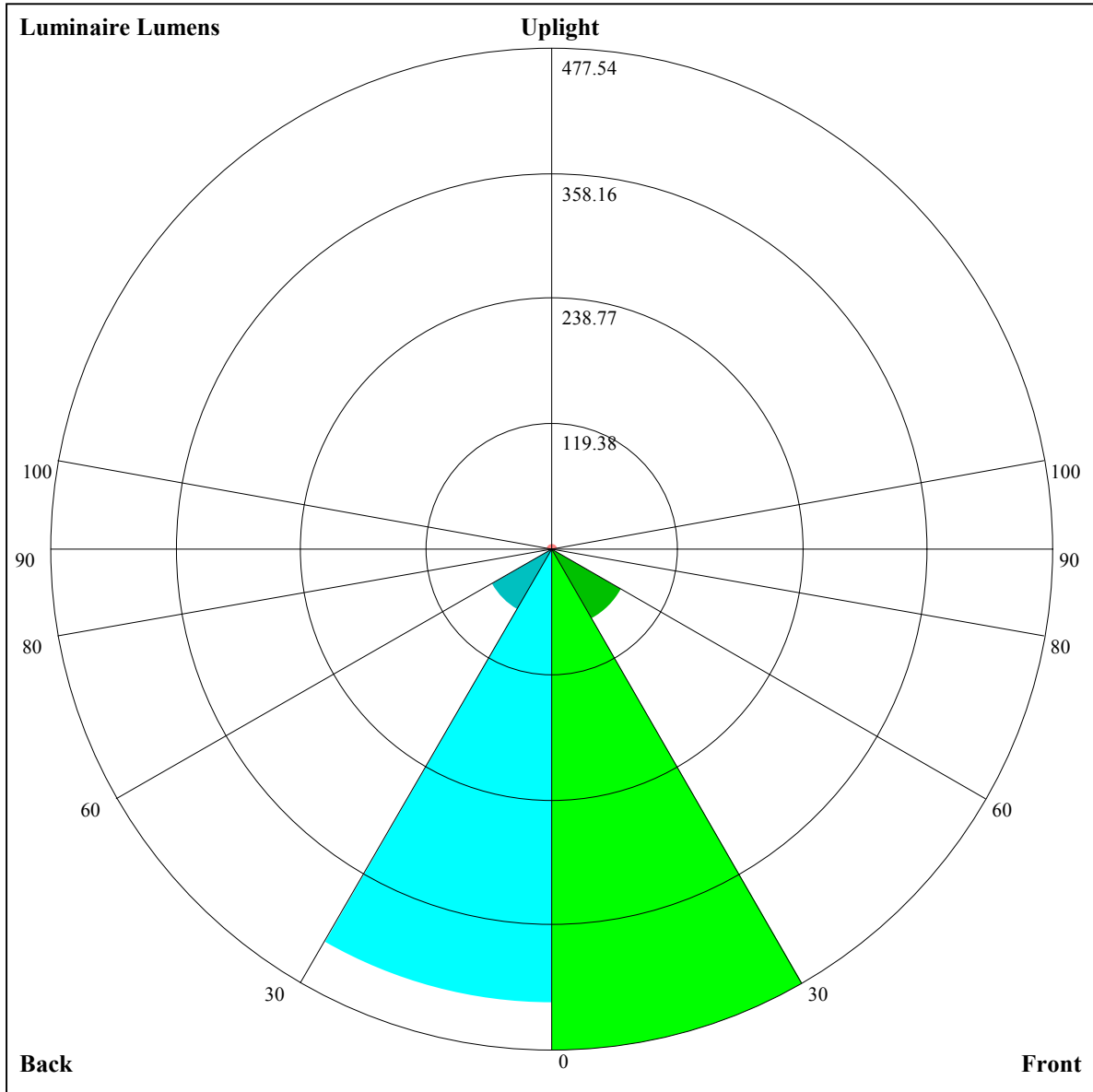
Luminance Limiting Curve





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	1.04	1.04	1.04	1.02	1.02	1.02	0.97	0.97	0.97	0.93	0.93	0.93	0.89	0.89	0.89	0.88
1	0.99	0.97	0.95	0.97	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.86	0.84
2	0.94	0.91	0.88	0.92	0.90	0.87	0.89	0.87	0.85	0.87	0.85	0.84	0.84	0.83	0.82	0.81
3	0.89	0.86	0.83	0.88	0.85	0.82	0.86	0.83	0.81	0.84	0.82	0.80	0.82	0.80	0.79	0.77
4	0.85	0.81	0.79	0.84	0.81	0.78	0.82	0.79	0.77	0.81	0.78	0.76	0.79	0.77	0.75	0.74
5	0.82	0.78	0.75	0.81	0.77	0.74	0.79	0.76	0.74	0.78	0.75	0.73	0.77	0.74	0.73	0.72
6	0.78	0.74	0.72	0.78	0.74	0.71	0.77	0.73	0.71	0.75	0.73	0.70	0.74	0.72	0.70	0.69
7	0.75	0.72	0.69	0.75	0.71	0.69	0.74	0.71	0.68	0.73	0.70	0.68	0.72	0.70	0.68	0.67
8	0.73	0.69	0.66	0.72	0.69	0.66	0.72	0.68	0.66	0.71	0.68	0.66	0.70	0.67	0.65	0.64
9	0.70	0.67	0.64	0.70	0.66	0.64	0.69	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	0.62	0.67	0.64	0.61	0.66	0.63	0.61	0.60





Luminaire Lumens:

FL=477.54,FM=77.47,FH=1.5,FVH=0.69

BL=432.94,BM=66.67,BH=1.47,BVH=0.68

UL=1.4,UH=6.69

BUG Rating:B1-U1-G0



Intensity data(cd)

C/γ(°)	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0
0.0	5073.32	5088.64	5065.44	4998.61	4883.53	4722.05	4507.67	4235.28	3894.22
45.0	4991.65	5076.11	5103.95	5124.83	5100.70	5068.68	4975.88	4826.46	4619.50
90.0	5062.19	5077.96	5061.72	5009.29	4907.66	4764.28	4569.85	4310.45	3998.16
135.0	5028.78	5038.99	5014.86	4951.75	4844.56	4691.42	4473.33	4196.30	3856.16
180.0	5073.32	5025.06	4939.68	4804.18	4613.93	4420.89	4123.45	3690.04	3352.69
225.0	4991.65	4861.72	4669.61	4419.04	4108.60	3742.94	3332.73	2886.80	2432.51
270.0	5062.19	4998.61	4894.67	4735.04	4507.67	4351.29	3892.82	3667.77	3259.88
315.0	5028.78	4972.16	4872.40	4721.12	4514.63	4247.81	3927.16	3554.08	3140.62
360.0	5073.32	5088.64	5065.44	4998.61	4883.53	4722.05	4507.67	4235.28	3894.22
C/γ(°)	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0
0.0	3483.55	3016.73	2530.88	2073.35	1687.27	1376.83	886.77	886.77	857.53
45.0	4356.39	4038.99	3657.09	3219.51	2737.84	2258.03	1826.48	1469.18	1186.58
90.0	3625.54	3199.09	2739.24	2372.19	1872.42	1527.64	1298.88	836.28	836.28
135.0	3544.33	3115.57	2567.54	2216.27	1828.34	1508.62	1252.47	1052.01	895.17
180.0	2897.47	2440.86	2019.06	1659.43	1367.55	1137.86	960.13	822.31	716.51
225.0	2006.99	1645.04	1355.02	889.60	889.60	834.33	718.97	633.31	568.21
270.0	2627.87	2359.66	1945.27	1596.79	1316.51	1093.77	918.37	781.94	678.93
315.0	2692.37	2252.93	2010.24	1531.36	1366.16	892.06	892.06	810.71	703.57
360.0	3483.55	3016.73	2530.88	2073.35	1687.27	1376.83	886.77	886.77	857.53
C/γ(°)	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0
0.0	737.35	648.07	580.65	529.74	491.13	462.59	442.83	428.07	415.82
45.0	969.88	807.46	690.06	605.61	546.68	503.99	472.43	450.16	436.24
90.0	761.15	662.08	589.09	534.80	495.45	465.84	444.92	429.14	418.09
135.0	773.13	678.46	605.61	549.00	505.38	472.43	451.55	433.45	419.53
180.0	633.45	569.88	522.08	485.43	458.98	439.49	425.10	412.11	401.90
225.0	518.60	482.41	455.82	438.28	425.01	413.36	403.11	395.26	388.26
270.0	602.36	544.82	502.13	470.11	447.37	431.60	420.00	407.93	402.36
315.0	621.29	560.09	514.24	479.25	454.57	437.17	423.66	412.99	402.22
360.0	737.35	648.07	580.65	529.74	491.13	462.59	442.83	428.07	415.82
C/γ(°)	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0
0.0	405.15	396.89	391.27	382.36	375.54	370.58	350.95	322.69	274.71
45.0	422.78	409.79	401.44	394.01	387.98	380.55	373.13	367.56	354.57
90.0	406.77	398.00	390.95	383.43	376.75	372.85	366.17	327.93	302.60
135.0	407.47	397.72	389.83	382.87	378.23	368.95	362.92	330.90	263.62
180.0	394.01	387.05	382.41	375.45	369.42	349.93	310.48	259.44	237.17
225.0	380.83	373.69	366.77	341.95	297.77	244.31	189.00	134.24	102.27
270.0	391.69	387.51	379.63	369.88	365.70	341.58	299.81	247.84	247.84
315.0	394.57	387.98	380.65	373.41	366.26	339.21	294.71	240.74	185.61
360.0	405.15	396.89	391.27	382.36	375.54	370.58	350.95	322.69	274.71
C/γ(°)	36.0	37.0	38.0	39.0	40.0	41.0	42.0	43.0	44.0
0.0	220.14	165.01	110.44	60.65	24.78	8.82	7.66	6.22	4.59
45.0	318.37	269.19	258.98	237.17	104.18	73.13	19.07	9.65	7.75
90.0	251.69	192.95	135.22	82.04	39.72	12.30	8.35	7.05	5.34
135.0	253.41	253.41	119.12	69.79	29.28	10.16	8.58	7.29	5.71
180.0	187.42	94.80	48.54	17.68	8.77	7.75	6.45	5.06	4.18
225.0	53.55	19.21	8.40	7.29	6.03	4.78	3.71	2.97	2.88
270.0	118.56	69.09	30.67	9.88	8.12	6.82	5.29	4.41	3.57
315.0	131.14	78.93	36.06	11.18	8.49	7.10	5.38	4.13	3.53
360.0	220.14	165.01	110.44	60.65	24.78	8.82	7.66	6.22	4.59

Intensity data(cd)

C/γ(°)	45.0	46.0	47.0	48.0	49.0	50.0	51.0	52.0	53.0
0.0	3.71	3.02	2.92	2.83	2.64	2.51	2.46	2.41	2.32
45.0	6.31	5.01	4.04	3.11	2.83	2.74	2.69	2.51	2.37
90.0	4.08	3.39	3.02	2.88	2.78	2.69	2.55	2.46	2.37
135.0	4.73	3.90	3.39	3.25	3.02	2.88	2.74	2.69	2.60
180.0	3.11	2.97	2.78	2.69	2.64	2.46	2.37	2.32	2.23
225.0	2.69	2.55	2.51	2.46	2.27	2.13	2.13	2.09	2.00
270.0	2.97	2.88	2.74	2.69	2.60	2.46	2.37	2.27	2.23
315.0	3.25	3.06	2.92	2.83	2.74	2.64	2.46	2.46	2.37
360.0	3.71	3.02	2.92	2.83	2.64	2.51	2.46	2.41	2.32
C/γ(°)	54.0	55.0	56.0	57.0	58.0	59.0	60.0	61.0	62.0
0.0	2.18	2.09	2.04	1.95	1.95	1.86	1.76	1.72	1.72
45.0	2.37	2.27	2.18	2.04	2.04	2.00	1.86	1.81	1.76
90.0	2.69	2.18	2.09	2.00	1.95	1.95	1.86	1.76	1.76
135.0	2.46	2.32	2.27	2.18	2.13	2.00	1.90	1.90	1.86
180.0	2.09	2.00	2.00	1.95	1.81	1.76	1.76	1.72	1.62
225.0	2.00	1.81	1.76	1.72	1.72	1.67	1.58	1.53	1.53
270.0	2.09	2.04	2.04	1.90	1.81	1.81	1.81	1.72	1.62
315.0	2.27	2.13	2.09	2.00	1.90	1.86	1.81	1.72	1.67
360.0	2.18	2.09	2.04	1.95	1.95	1.86	1.76	1.72	1.72
C/γ(°)	63.0	64.0	65.0	66.0	67.0	68.0	69.0	70.0	71.0
0.0	1.67	1.62	1.53	1.53	1.53	1.44	1.39	1.39	1.44
45.0	1.72	1.62	1.58	1.62	1.58	1.48	1.44	1.48	1.44
90.0	1.72	1.67	1.58	1.58	1.58	1.48	1.44	1.44	1.44
135.0	1.76	1.67	1.67	1.62	1.58	1.48	1.53	1.44	1.44
180.0	1.58	1.58	1.48	1.48	1.44	1.44	1.39	1.39	1.39
225.0	1.53	1.44	1.39	1.39	1.39	1.35	1.30	1.30	1.35
270.0	1.62	1.53	1.58	1.48	1.48	1.44	1.44	1.44	1.39
315.0	1.62	1.62	1.58	1.53	1.48	1.44	1.39	1.81	1.39
360.0	1.67	1.62	1.53	1.53	1.53	1.44	1.39	1.39	1.44
C/γ(°)	72.0	73.0	74.0	75.0	76.0	77.0	78.0	79.0	80.0
0.0	1.35	1.30	1.35	1.30	1.30	1.30	1.21	1.25	1.21
45.0	1.35	1.35	1.35	1.35	1.25	1.25	1.30	1.25	1.21
90.0	1.44	1.30	1.35	1.35	1.35	1.30	1.30	1.30	1.30
135.0	1.44	1.39	1.35	1.30	1.30	1.35	1.25	1.21	1.25
180.0	1.35	1.30	1.25	1.30	1.25	1.21	1.21	1.30	1.25
225.0	1.30	1.21	1.21	1.21	1.25	1.25	1.21	1.16	1.21
270.0	1.35	1.39	1.35	1.35	1.25	1.35	1.35	1.30	1.25
315.0	1.35	1.25	1.30	1.35	1.25	1.21	1.21	1.21	1.25
360.0	1.35	1.30	1.35	1.30	1.30	1.30	1.21	1.25	1.21
C/γ(°)	81.0	82.0	83.0	84.0	85.0	86.0	87.0	88.0	89.0
0.0	1.21	1.16	1.25	1.16	1.25	1.21	1.21	1.25	1.30
45.0	1.25	1.25	1.21	1.21	1.25	1.16	1.21	1.21	1.16
90.0	1.25	1.25	1.30	1.25	1.30	1.30	1.30	1.30	1.30
135.0	1.30	1.21	1.21	1.16	1.21	1.25	1.21	1.21	1.21
180.0	1.21	1.16	1.16	1.21	1.16	1.16	1.16	1.21	1.35
225.0	1.16	1.11	1.16	1.16	1.21	1.16	1.25	1.21	1.16
270.0	1.30	1.30	1.30	1.21	1.30	1.25	1.35	1.35	1.35
315.0	1.21	1.21	1.21	1.25	1.16	1.21	1.21	1.35	1.35
360.0	1.21	1.16	1.25	1.16	1.25	1.21	1.21	1.25	1.30

Intensity data(cd)

<b>C/γ(°)</b>	<b>90.0</b>
<b>0.0</b>	<b>1.35</b>
<b>45.0</b>	<b>1.25</b>
<b>90.0</b>	<b>1.35</b>
<b>135.0</b>	<b>1.21</b>
<b>180.0</b>	<b>1.16</b>
<b>225.0</b>	<b>1.21</b>
<b>270.0</b>	<b>1.44</b>
<b>315.0</b>	<b>1.35</b>
<b>360.0</b>	<b>1.35</b>