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## NATA

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LumCAT: 3-1549-A3  
Luminaire: 99.02.73.172+92.76.365.00  
Report No: NATA0100 Voltage(V): 36.2000  
Test No: GC2018111602 Current(A): 0.5000  
LampCAT: OSRAM OPTO SOLERIQ S13 G2 Power (W): 18.1000  
Lamp flux(lm): 1701.6 PF: 0.0000  
Number of Lamps: 1 Ballast type: DC  
Length(mm): 79 Width(mm): 79  
Phm Type: C Height(mm): 0

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## Photometric Results

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Lumens(lm): 1574.76  
Efficiency(%): 92.54%  
Lumens(lm)/Power(W): 87.09  
Central intensity(cd): 6638.765  
Maximum intensity(cd): 6638.765  
Angle of maximum intensity: C=0.0  $\gamma$ =0.0  
Beam Angle(50%Imax): [C0/180]Total=22.0  
                                  [C90/270]Total=22.0  
Field angle(10%Imax): [C0/180]Total=50.6  
                                  [C90/270]Total=50.6  
Maximum s/h(1/2): C0\_180=0.37 C90\_270=0.37  
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(%): 92.63%  
Up flux rate of LUM(%): - -  
Down flux rate of LUM(%): 100.00%  
CIE Type : Direct lighting  
Output flux ratio in  $\pi$  solid angle : 98.605%

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	6638.766	1.588	1.588	.093%	.101%
1.0	6602.766	12.637	14.225	.743%	.903%
2.0	6490.125	24.838	39.063	1.460%	2.481%
3.0	6295.992	36.134	75.197	2.123%	4.775%
4.0	6055.594	46.323	121.52	2.722%	7.717%
5.0	5766.398	55.113	176.633	3.239%	11.216%
6.0	5372.297	61.581	238.214	3.619%	15.127%
7.0	4995.352	66.759	304.973	3.923%	19.366%
8.0	4609.617	70.351	375.324	4.134%	23.834%
9.0	4165.594	71.460	446.784	4.199%	28.372%
10.0	3721.711	70.870	517.654	4.165%	32.872%
11.0	3322.266	69.516	587.17	4.085%	37.286%
12.0	2922.469	66.632	653.802	3.916%	41.518%
13.0	2521.055	62.190	715.992	3.655%	45.467%
14.0	2185.242	57.973	773.965	3.407%	49.148%
15.0	1886.273	53.537	827.502	3.146%	52.548%
16.0	1633.852	49.386	876.888	2.902%	55.684%
17.0	1396.216	44.765	921.653	2.631%	58.527%
18.0	1227.002	41.580	963.233	2.443%	61.167%
19.0	1080.584	38.579	1001.812	2.267%	63.617%
20.0	980.170	36.762	1038.574	2.160%	65.951%
21.0	891.035	35.017	1073.591	2.058%	68.175%
22.0	822.762	33.799	1107.39	1.986%	70.321%
23.0	764.606	32.762	1140.152	1.925%	72.402%
24.0	710.402	31.686	1171.838	1.862%	74.414%
25.0	672.715	31.177	1203.014	1.832%	76.393%
26.0	641.334	30.830	1233.845	1.812%	78.351%
27.0	614.770	30.606	1264.451	1.799%	80.295%
28.0	593.719	30.566	1295.017	1.796%	82.236%
29.0	577.125	30.683	1325.7	1.803%	84.184%
30.0	561.263	30.774	1356.474	1.809%	86.138%
31.0	540.035	30.501	1386.975	1.792%	88.075%
32.0	504.563	29.321	1416.296	1.723%	89.937%
33.0	462.895	27.647	1443.943	1.625%	91.693%
34.0	408.516	25.051	1468.994	1.472%	93.284%
35.0	344.194	21.649	1490.643	1.272%	94.658%
36.0	258.757	16.679	1507.322	.980%	95.717%
37.0	193.043	12.740	1520.062	.749%	96.526%

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
38.0	142.123	9.595	1529.657	.564%	97.136%
39.0	74.363	5.132	1534.789	.302%	97.462%
40.0	44.522	3.138	1537.927	.184%	97.661%
41.0	23.948	1.723	1539.65	.101%	97.770%
42.0	18.148	1.332	1540.982	.078%	97.855%
43.0	16.235	1.214	1542.196	.071%	97.932%
44.0	13.676	1.042	1543.238	.061%	97.998%
45.0	11.552	0.896	1544.133	.053%	98.055%
46.0	10.645	0.840	1544.973	.049%	98.108%
47.0	9.246	0.742	1545.715	.044%	98.155%
48.0	8.114	0.661	1546.376	.039%	98.197%
49.0	7.973	0.660	1547.036	.039%	98.239%
50.0	7.854	0.660	1547.696	.039%	98.281%
51.0	7.692	0.656	1548.351	.039%	98.323%
52.0	7.615	0.658	1549.009	.039%	98.365%
53.0	7.530	0.660	1549.669	.039%	98.407%
54.0	7.418	0.658	1550.327	.039%	98.448%
55.0	7.348	0.660	1550.987	.039%	98.490%
56.0	7.270	0.661	1551.648	.039%	98.532%
57.0	7.200	0.662	1552.31	.039%	98.574%
58.0	7.144	0.664	1552.974	.039%	98.616%
59.0	7.080	0.666	1553.64	.039%	98.659%
60.0	7.031	0.668	1554.308	.039%	98.701%
61.0	6.975	0.669	1554.977	.039%	98.744%
62.0	6.933	0.671	1555.648	.039%	98.786%
63.0	6.877	0.672	1556.32	.039%	98.829%
64.0	6.841	0.674	1556.994	.040%	98.872%
65.0	6.813	0.677	1557.671	.040%	98.915%
66.0	6.785	0.680	1558.351	.040%	98.958%
67.0	6.771	0.683	1559.035	.040%	99.001%
68.0	6.722	0.683	1559.718	.040%	99.045%
69.0	6.715	0.687	1560.405	.040%	99.088%
70.0	6.680	0.688	1561.094	.040%	99.132%
71.0	6.645	0.689	1561.783	.040%	99.176%
72.0	6.652	0.694	1562.476	.041%	99.220%
73.0	6.616	0.694	1563.17	.041%	99.264%
74.0	6.609	0.697	1563.867	.041%	99.308%
75.0	6.581	0.697	1564.564	.041%	99.352%

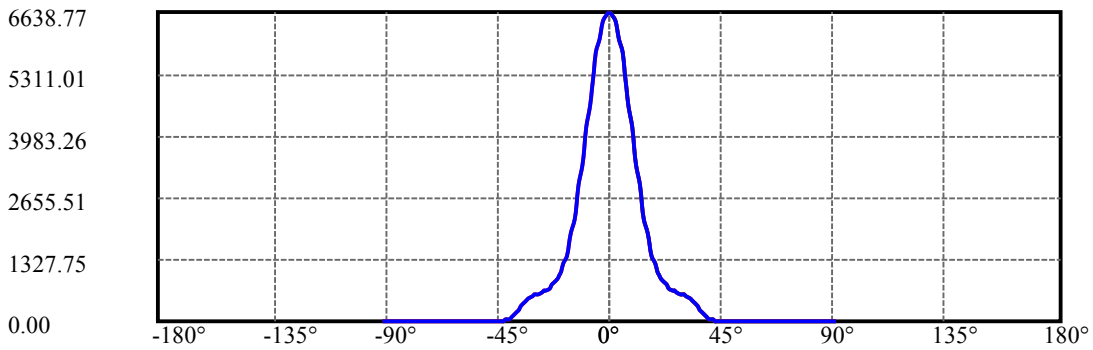
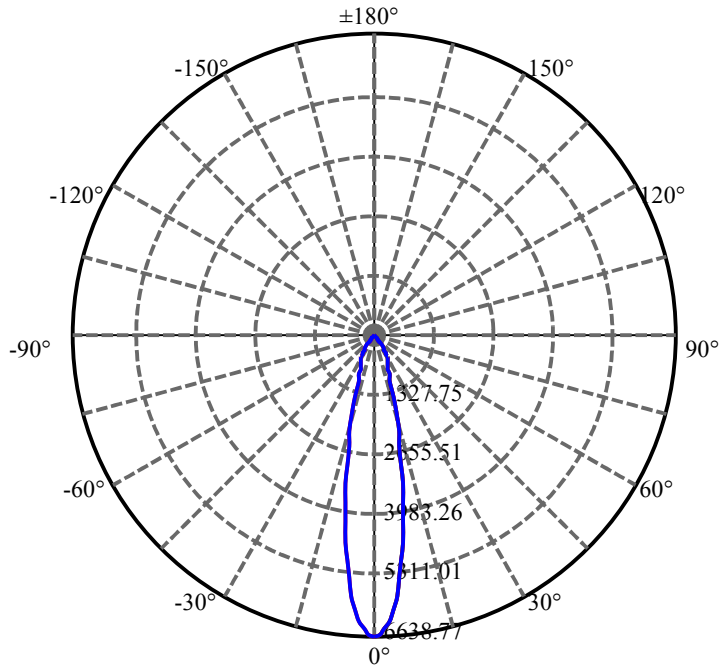
$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
76.0	6.567	0.699	1565.263	.041%	99.397%
77.0	6.560	0.701	1565.964	.041%	99.441%
78.0	6.539	0.701	1566.665	.041%	99.486%
79.0	6.525	0.702	1567.368	.041%	99.530%
80.0	6.511	0.703	1568.071	.041%	99.575%
81.0	6.504	0.704	1568.775	.041%	99.620%
82.0	6.497	0.706	1569.481	.041%	99.665%
83.0	6.483	0.706	1570.186	.041%	99.709%
84.0	6.490	0.708	1570.894	.042%	99.754%
85.0	6.483	0.708	1571.602	.042%	99.799%
86.0	6.434	0.704	1572.306	.041%	99.844%
87.0	6.427	0.704	1573.01	.041%	99.889%
88.0	6.398	0.701	1573.711	.041%	99.933%
89.0	6.391	0.701	1574.412	.041%	99.978%
90.0	6.384	0.350	1574.762	.021%	100.000%

ZONAL LUMEN SUMMARY

Zone	Lumens	%Lamp	%Fixt
0-30	1356.47	79.72%	86.14%
0-40	1537.93	90.38%	97.66%
0-60	1554.31	91.34%	98.70%
0-90	1574.41	92.52%	99.98%
0-120	1574.41	92.52%	99.98%
0-180	1574.76	92.54%	100.00%
60-90	20.77	1.22%	1.32%
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	1259.81	74.04%	80.00%

ZONAL LUMEN SUMMARY

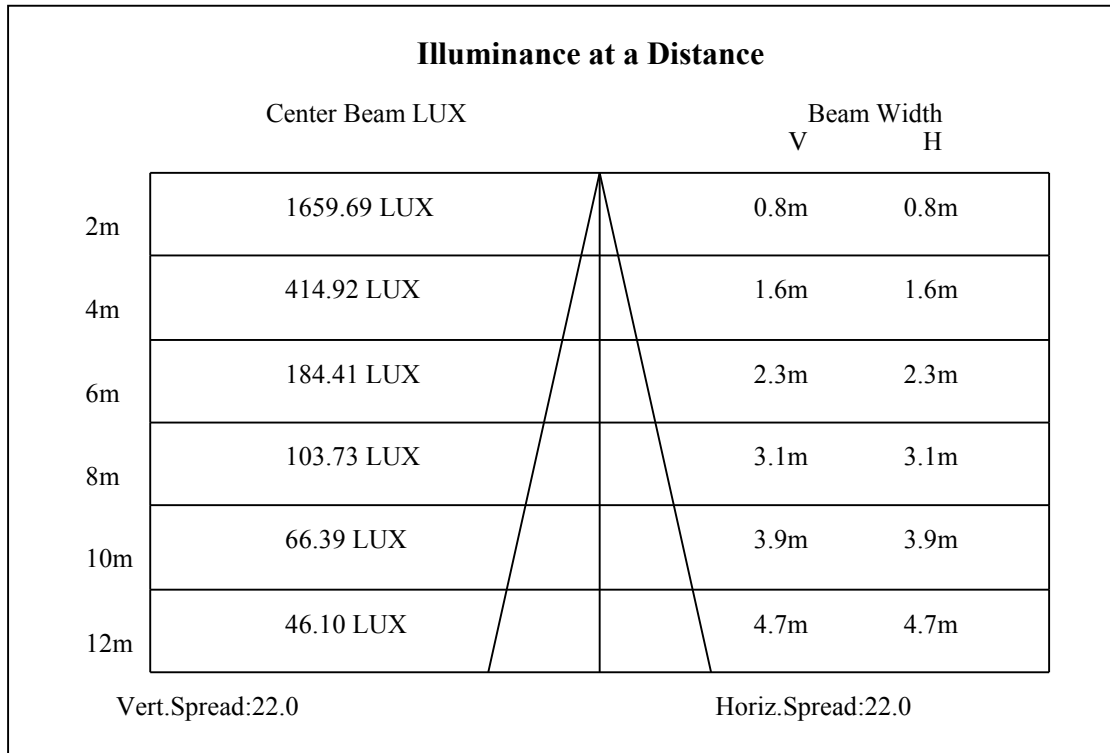
0-10	517.65
10-20	520.92
20-30	317.90
30-40	181.45
40-50	9.77
50-60	6.61
60-70	6.79
70-80	6.98
80-90	6.34
90-100	0.00
100-110	0.00
110-120	0.00
120-130	0.00
130-140	0.00
140-150	0.00
150-160	0.00
160-170	0.00
170-180	0.00

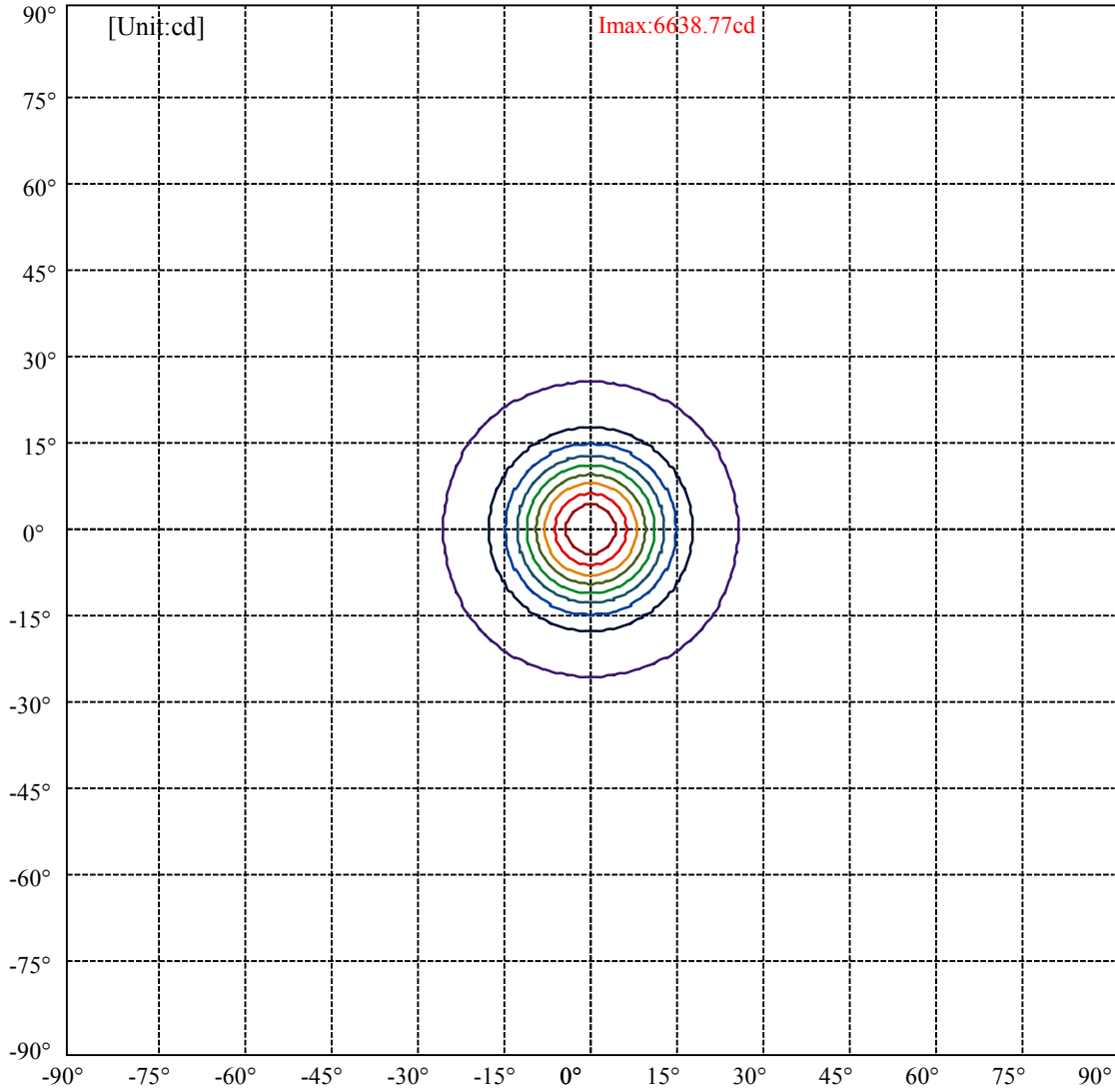


C0(Max): —————  
C0/C180: —————  
C90/C270: —————

Field angle(10%Imax):C0/180Left:25.3 Right:25.3  
:C90/270Left:25.3 Right:25.3

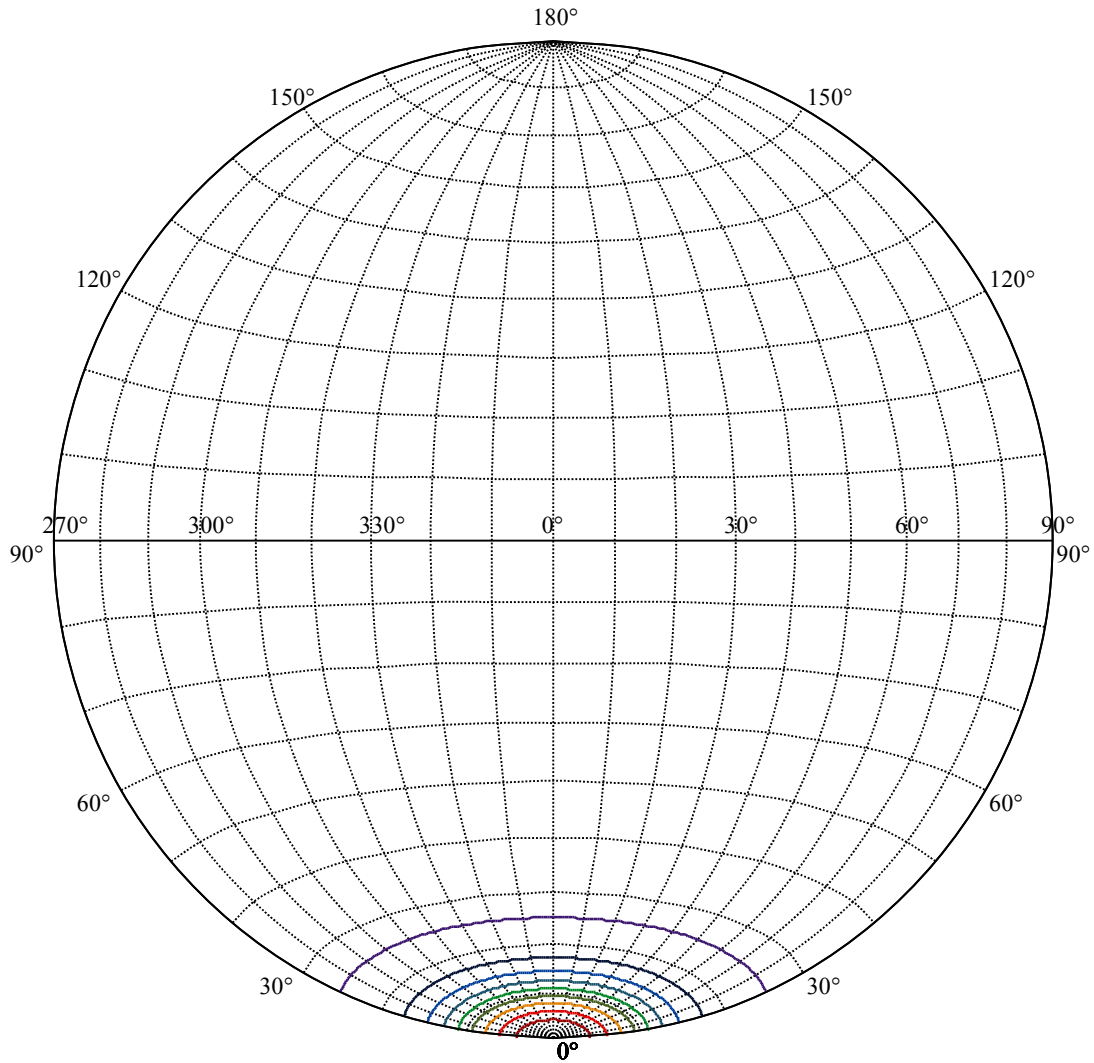
Beam Angle(50%Imax):C0/180Left:11.0 Right:11.0  
:C90/270Left:11.0 Right:11.0





(10%Imax) 663.877	—
(20%Imax) 1327.75	—
(30%Imax) 1991.63	—
(40%Imax) 2655.51	—
(50%Imax) 3319.38	—
(60%Imax) 3983.26	—
(70%Imax) 4647.14	—
(80%Imax) 5311.01	—
(90%Imax) 5974.89	—





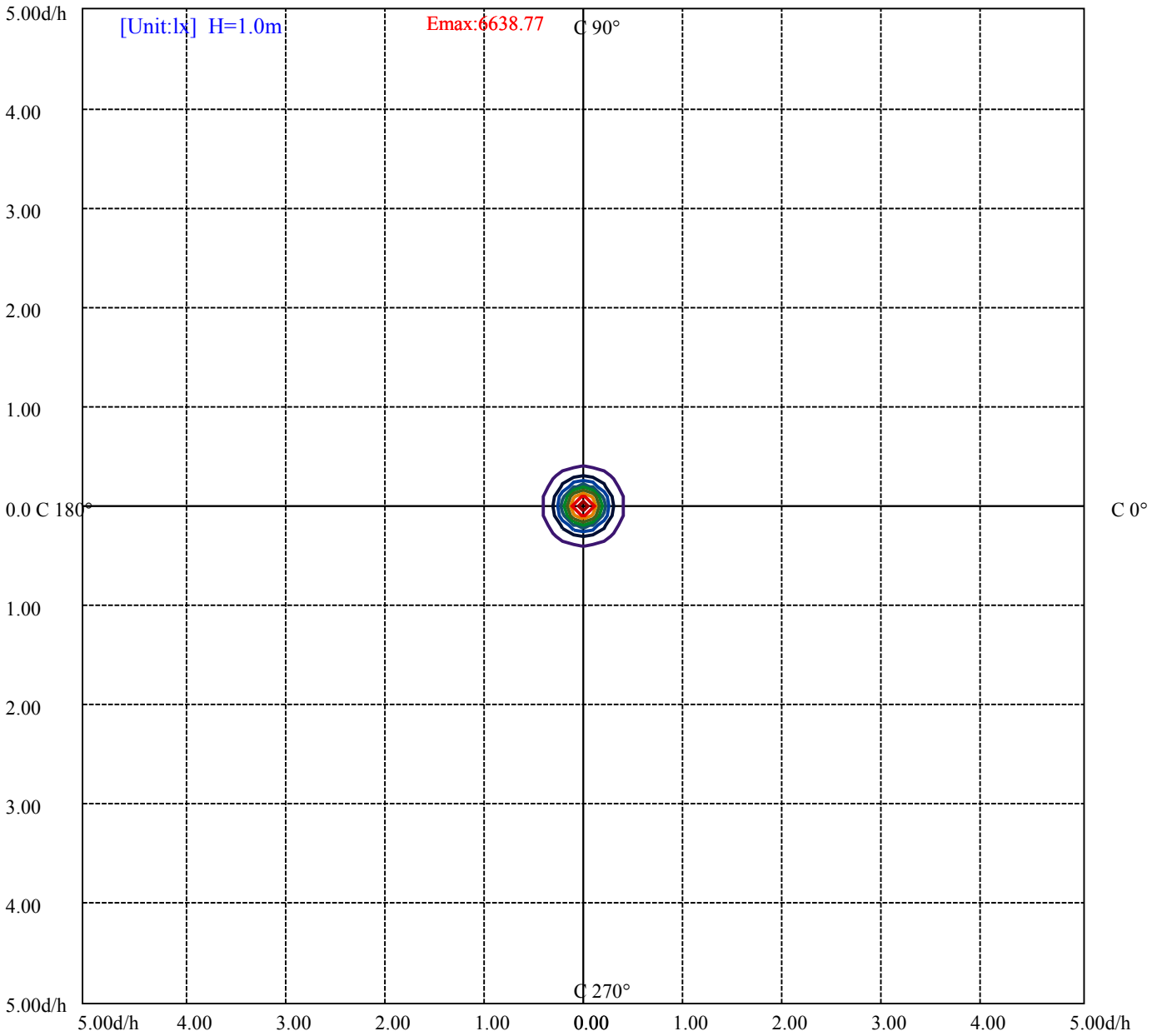
House

[Unit:cd]

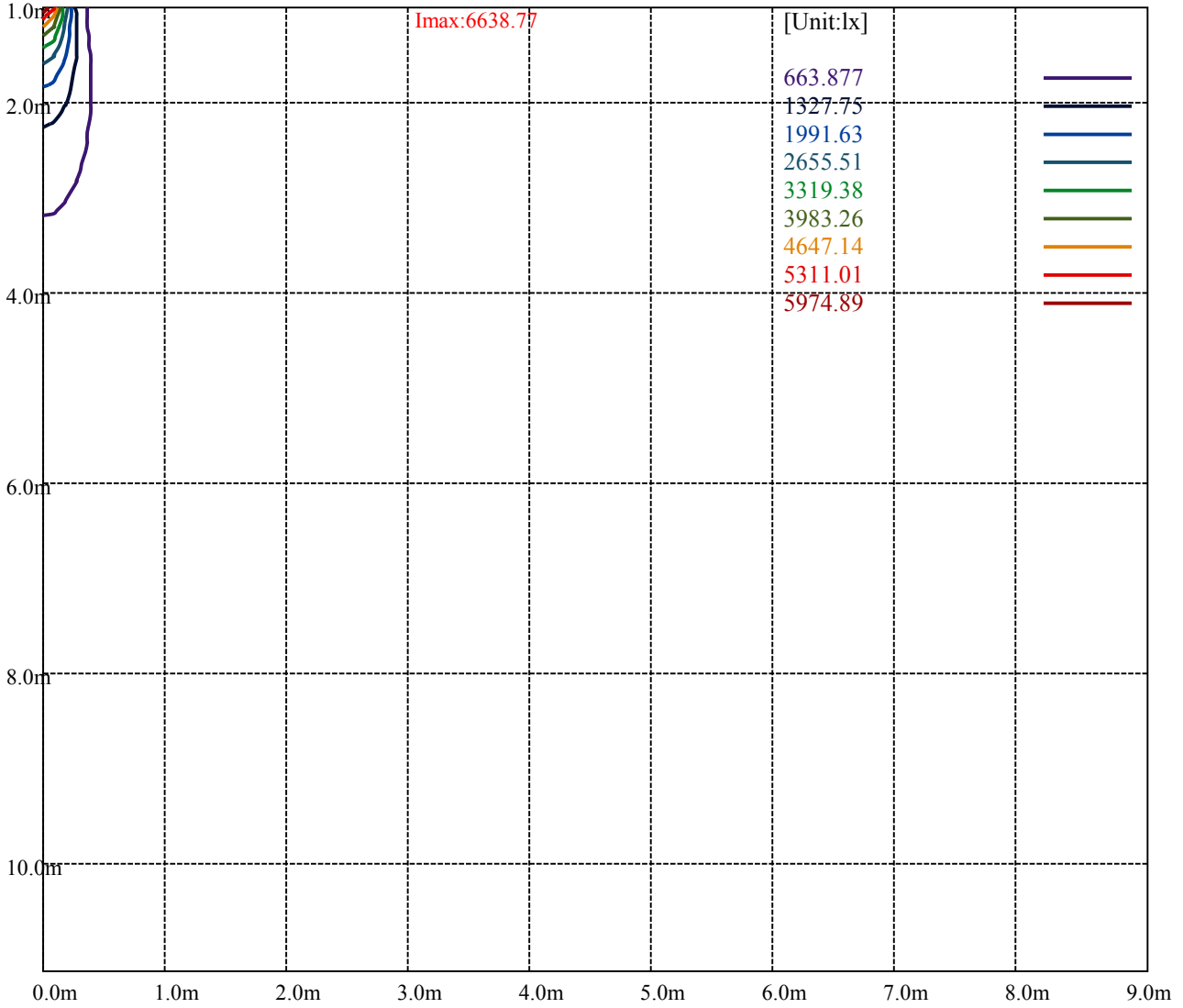
Road

**Imax:6638.77**

(10%Imax) 663.877	—
(20%Imax) 1327.75	—
(30%Imax) 1991.63	—
(40%Imax) 2655.51	—
(50%Imax) 3319.38	—
(60%Imax) 3983.26	—
(70%Imax) 4647.14	—
(80%Imax) 5311.01	—
(90%Imax) 5974.89	—



- (10%Emax) 663.876
- (20%Emax) 1327.75
- (30%Emax) 1991.63
- (40%Emax) 2655.5
- (50%Emax) 3319.38
- (60%Emax) 3983.26
- (70%Emax) 4647.13
- (80%Emax) 5311.01
- (90%Emax) 5974.88



Luminance Table

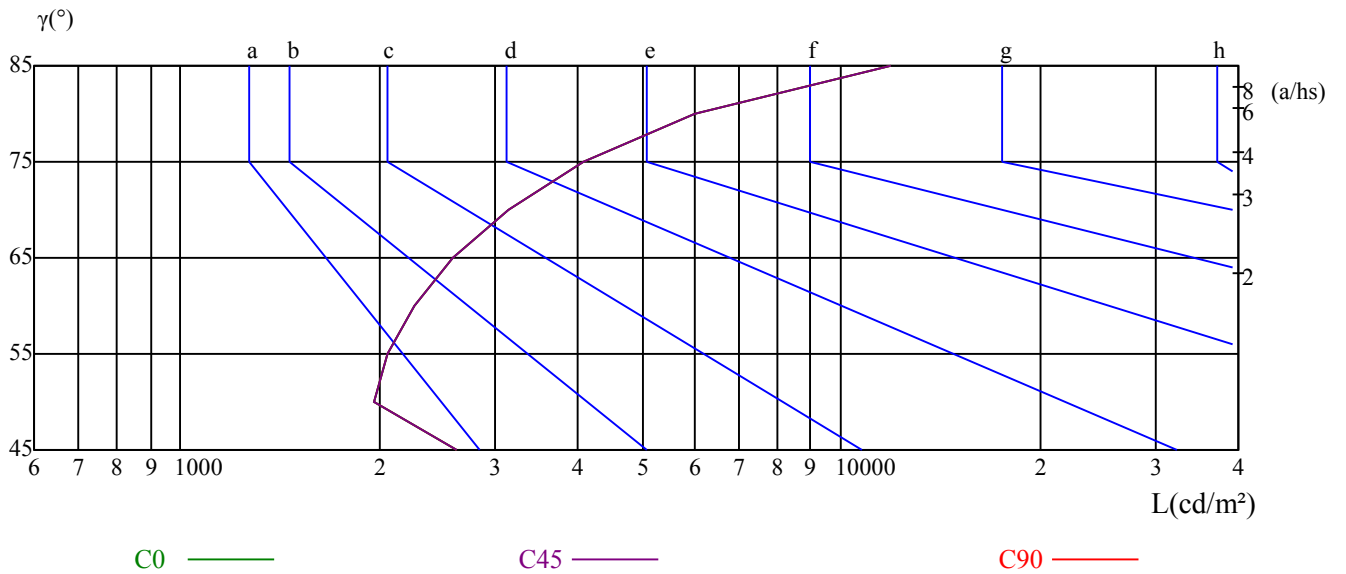
$\gamma$	45	50	55	60	65	70	75	80	85
C0	2618	1958	2053	2253	2583	3129	4074	6008	11918
C45	2618	1958	2053	2253	2583	3129	4074	6008	11918
C90	2618	1958	2053	2253	2583	3129	4074	6008	11918

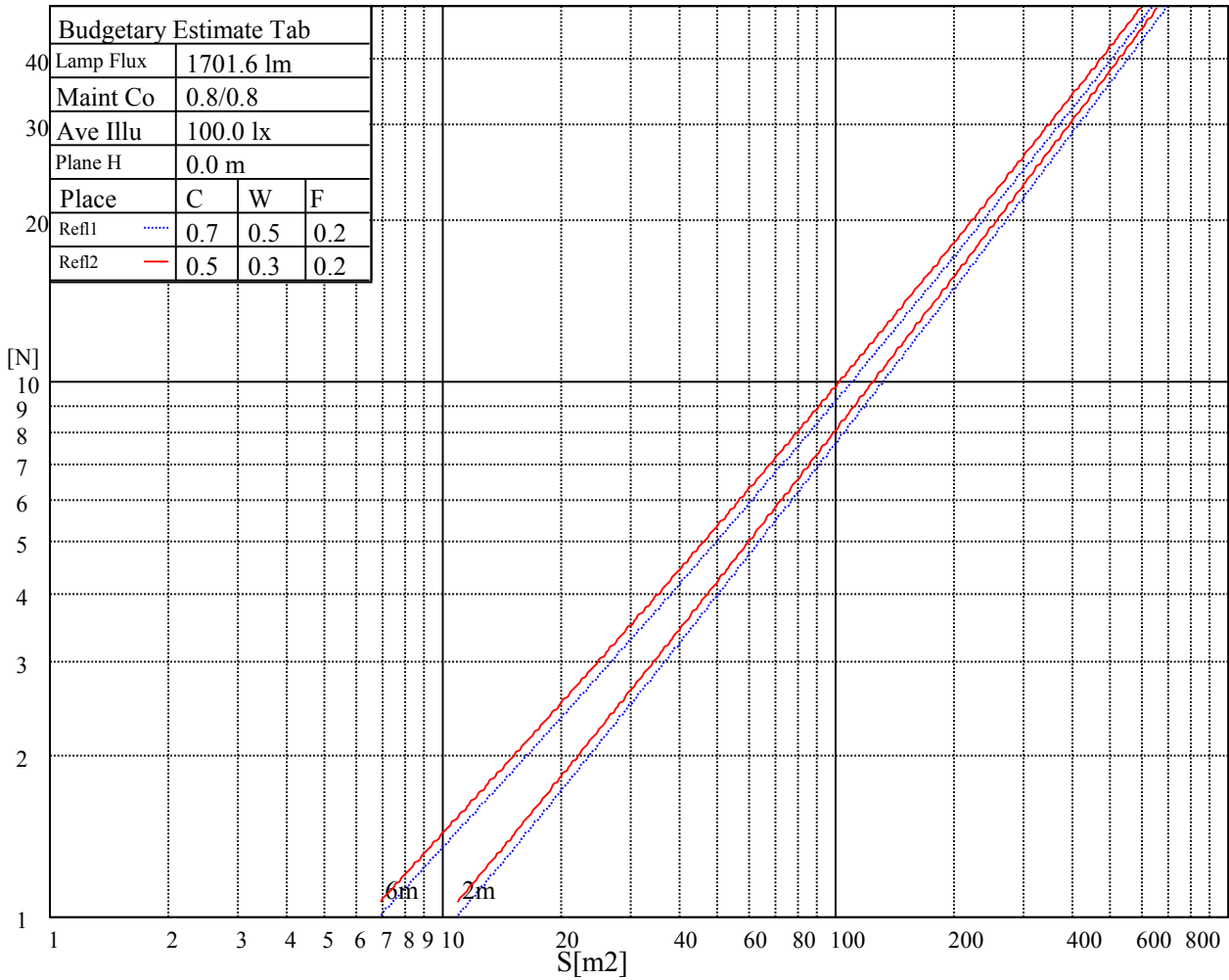
L(Hor)(65)	L(Ver)(65)	L45(65)	L(Hor)(75)	L(Ver)(75)	L45(75)	L(Hor)(85)	L(Ver)(85)	L45(85)
2583	2583	2583	4074	4074	4074	11918	11918	11918

Glare Table

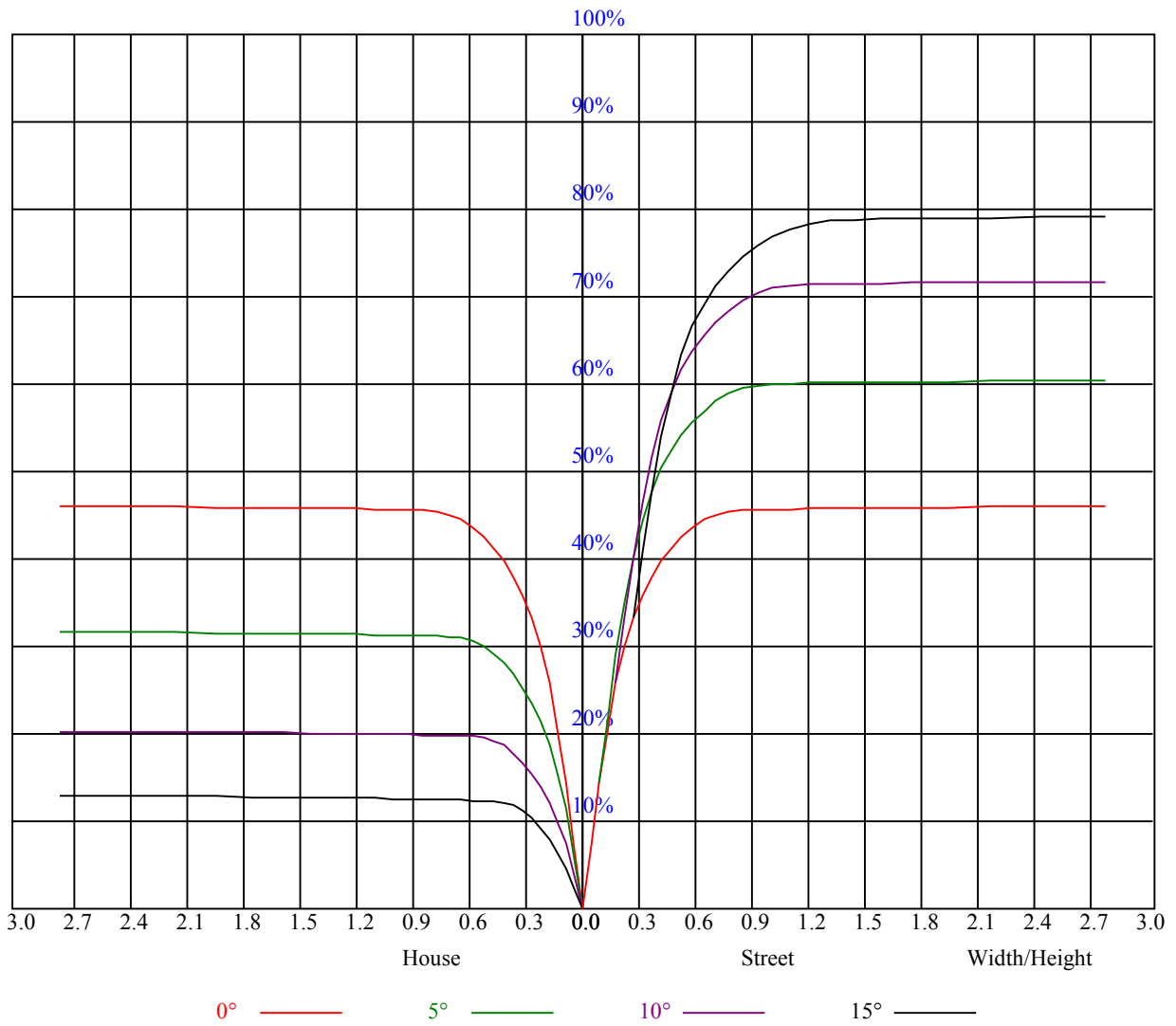
Glare	Quality	Service Values Illuminance(lx)							
1.15	A	2000	1000	500	<=300				
1.5	B		2000	1000	500	<=300			
1.85	C			2000	1000	500	<=300		
2.2	D				2000	1000	500	<=300	
2.55	E					2000	1000	500	<=300
		a	b	c	d	e	f	g	h

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	1.10	1.10	1.10	1.08	1.08	1.08	1.03	1.03	1.03	0.99	0.99	0.99	0.95	0.95	0.95	0.93
1	1.04	1.02	1.00	1.02	1.00	0.98	0.98	0.97	0.95	0.95	0.93	0.92	0.91	0.91	0.90	0.88
2	0.98	0.95	0.92	0.97	0.94	0.91	0.94	0.91	0.89	0.91	0.89	0.87	0.88	0.87	0.86	0.84
3	0.93	0.90	0.87	0.92	0.89	0.86	0.90	0.87	0.85	0.88	0.85	0.83	0.86	0.84	0.82	0.81
4	0.89	0.85	0.82	0.88	0.84	0.81	0.86	0.83	0.80	0.84	0.82	0.79	0.83	0.81	0.79	0.77
5	0.85	0.81	0.78	0.84	0.80	0.77	0.83	0.79	0.77	0.81	0.78	0.76	0.80	0.78	0.76	0.74
6	0.82	0.77	0.74	0.81	0.77	0.74	0.80	0.76	0.74	0.79	0.76	0.73	0.78	0.75	0.73	0.72
7	0.79	0.74	0.71	0.78	0.74	0.71	0.77	0.73	0.71	0.76	0.73	0.70	0.75	0.72	0.70	0.69
8	0.76	0.72	0.69	0.75	0.71	0.68	0.74	0.71	0.68	0.74	0.70	0.68	0.73	0.70	0.68	0.67
9	0.73	0.69	0.66	0.73	0.69	0.66	0.72	0.68	0.66	0.71	0.68	0.66	0.71	0.68	0.65	0.65
10	0.71	0.67	0.64	0.70	0.67	0.64	0.70	0.66	0.64	0.69	0.66	0.64	0.69	0.66	0.63	0.62



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	6609.94	6697.13	6693.19	6625.69	6463.69	6249.38	5937.19	5577.75	5235.75
45.0	6678.56	6585.19	6380.44	6151.50	5871.38	5509.69	5107.50	4728.38	4284.56
90.0	6609.38	6459.75	6252.75	5920.88	5608.69	5256.00	4772.25	4366.13	3947.63
135.0	6657.19	6514.88	6293.81	6044.63	5716.69	5376.94	4953.38	4506.75	4095.56
180.0	6609.94	6456.38	6246.56	5917.50	5607.00	5255.44	4772.25	4365.00	3944.81
225.0	6678.56	6705.56	6661.13	6501.38	6305.06	6056.44	5684.06	5348.25	4987.69
270.0	6609.38	6698.81	6705.00	6637.50	6474.38	6262.88	5953.50	5601.38	5256.56
315.0	6657.19	6704.44	6688.13	6568.88	6397.88	6164.44	5798.25	5469.19	5124.38
360.0	6609.94	6697.13	6693.19	6625.69	6463.69	6249.38	5937.19	5577.75	5235.75
C/γ(°)	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0
0.0	4832.44	4403.25	4004.44	3597.19	3094.88	2712.38	2359.13	2007.00	1703.25
45.0	3818.81	3403.13	2954.25	2586.94	2212.88	1885.50	1631.81	1440.56	1204.31
90.0	3474.56	3022.31	2653.88	2277.00	1942.88	1683.00	1437.75	1210.50	1100.19
135.0	3624.19	3162.94	2779.31	2431.13	2041.88	1767.38	1537.88	1348.88	1154.25
180.0	3475.13	3029.63	2670.75	2301.75	1968.75	1710.56	1469.25	1293.19	1112.85
225.0	4547.25	4082.06	3665.81	3208.50	2826.00	2433.38	2087.44	1813.50	1551.38
270.0	4843.69	4403.81	3994.31	3584.81	3134.81	2710.13	2362.50	2050.31	1717.88
315.0	4708.69	4266.56	3855.38	3392.44	2946.38	2579.63	2204.44	1906.88	1625.63
360.0	4832.44	4403.25	4004.44	3597.19	3094.88	2712.38	2359.13	2007.00	1703.25
C/γ(°)	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0
0.0	1481.06	1281.94	1130.63	1025.44	930.94	861.75	793.13	731.81	686.25
45.0	1077.75	988.31	879.75	813.94	761.63	697.50	654.19	628.88	603.56
90.0	979.03	893.19	821.42	747.17	698.23	660.38	625.78	606.21	590.40
135.0	1036.69	930.94	842.63	777.38	716.06	676.13	643.50	620.44	600.19
180.0	1001.93	913.84	840.71	764.16	715.67	679.22	644.57	622.29	603.17
225.0	1339.31	1113.64	1060.31	959.57	884.08	817.88	746.94	703.29	669.49
270.0	1501.31	1323.00	1152.00	1046.81	959.06	876.38	803.81	749.81	700.31
315.0	1398.94	1199.81	1113.92	993.83	916.43	847.63	771.30	718.99	677.31
360.0	1481.06	1281.94	1130.63	1025.44	930.94	861.75	793.13	731.81	686.25
C/γ(°)	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0
0.0	651.94	623.25	606.38	587.25	569.81	556.88	545.63	514.69	453.94
45.0	586.69	570.38	552.94	542.25	527.06	478.69	422.44	348.19	290.25
90.0	571.61	556.31	544.56	532.35	498.43	435.32	360.11	287.49	206.10
135.0	581.63	564.19	552.38	541.69	512.44	459.56	389.81	318.38	291.94
180.0	581.29	564.86	551.87	539.04	509.74	448.14	380.08	297.62	216.17
225.0	639.68	616.11	595.24	576.96	563.01	549.06	527.40	477.28	406.24
270.0	666.56	637.88	615.38	594.56	576.56	560.25	547.31	526.50	459.00
315.0	638.78	616.78	598.28	576.00	563.23	548.61	530.38	497.98	429.92
360.0	651.94	623.25	606.38	587.25	569.81	556.88	545.63	514.69	453.94
C/γ(°)	36.0	37.0	38.0	39.0	40.0	41.0	42.0	43.0	44.0
0.0	385.88	304.31	285.75	144.39	81.84	34.54	23.46	21.26	17.78
45.0	183.66	122.12	60.13	25.59	21.49	19.01	15.41	13.56	12.15
90.0	131.57	74.48	33.58	20.03	17.89	15.08	12.38	11.42	9.45
135.0	158.74	101.53	41.06	20.53	18.51	15.98	13.28	12.26	10.29
180.0	149.01	82.01	38.14	22.67	20.53	17.94	15.58	13.61	10.46
225.0	326.03	250.88	179.16	99.51	47.81	24.81	22.16	19.24	16.59
270.0	393.75	330.75	292.50	151.20	87.98	36.96	22.05	20.25	17.38
315.0	341.44	278.27	206.66	110.98	60.13	27.28	20.87	18.28	15.30
360.0	385.88	304.31	285.75	144.39	81.84	34.54	23.46	21.26	17.78



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	15.13	13.84	11.25	8.38	8.21	8.10	7.88	7.82	7.65
45.0	8.83	8.27	8.04	7.93	7.82	7.71	7.59	7.48	7.43
90.0	8.21	8.04	7.93	7.76	7.71	7.59	7.48	7.43	7.31
135.0	8.33	8.16	7.99	7.88	7.76	7.71	7.54	7.48	7.43
180.0	8.27	8.10	7.99	7.88	7.82	7.65	7.59	7.48	7.43
225.0	15.13	11.98	8.44	8.27	8.04	7.93	7.76	7.71	7.65
270.0	14.96	14.12	12.15	8.55	8.33	8.16	7.88	7.82	7.71
315.0	13.56	12.66	10.18	8.27	8.10	7.99	7.82	7.71	7.65
360.0	15.13	13.84	11.25	8.38	8.21	8.10	7.88	7.82	7.65
C/γ(°)	54.0	55.0	56.0	57.0	58.0	59.0	60.0	61.0	62.0
0.0	7.54	7.48	7.37	7.31	7.26	7.14	7.09	7.03	6.98
45.0	7.31	7.26	7.20	7.14	7.09	6.98	6.98	6.92	6.86
90.0	7.26	7.20	7.14	7.03	6.98	6.98	6.92	6.86	6.86
135.0	7.31	7.26	7.20	7.14	7.09	7.03	6.98	6.92	6.92
180.0	7.31	7.26	7.20	7.14	7.09	7.03	7.03	6.98	6.92
225.0	7.48	7.43	7.31	7.26	7.20	7.14	7.03	7.03	6.98
270.0	7.59	7.48	7.43	7.31	7.26	7.20	7.14	7.09	7.03
315.0	7.54	7.43	7.31	7.26	7.20	7.14	7.09	6.98	6.92
360.0	7.54	7.48	7.37	7.31	7.26	7.14	7.09	7.03	6.98
C/γ(°)	63.0	64.0	65.0	66.0	67.0	68.0	69.0	70.0	71.0
0.0	6.92	6.86	6.86	6.81	6.81	6.75	6.75	6.75	6.69
45.0	6.81	6.81	6.75	6.75	6.75	6.69	6.69	6.64	6.58
90.0	6.81	6.75	6.75	6.75	6.69	6.69	6.69	6.64	6.64
135.0	6.86	6.81	6.81	6.81	6.75	6.69	6.69	6.69	6.64
180.0	6.86	6.86	6.81	6.81	6.81	6.75	6.75	6.69	6.64
225.0	6.92	6.86	6.86	6.81	6.81	6.75	6.69	6.69	6.64
270.0	6.98	6.92	6.86	6.81	6.81	6.75	6.75	6.69	6.69
315.0	6.86	6.86	6.81	6.75	6.75	6.69	6.69	6.64	6.64
360.0	6.92	6.86	6.86	6.81	6.81	6.75	6.75	6.75	6.69
C/γ(°)	72.0	73.0	74.0	75.0	76.0	77.0	78.0	79.0	80.0
0.0	6.69	6.64	6.64	6.64	6.58	6.58	6.58	6.58	6.58
45.0	6.64	6.58	6.58	6.58	6.58	6.53	6.53	6.47	6.47
90.0	6.64	6.58	6.58	6.53	6.53	6.53	6.53	6.53	6.47
135.0	6.64	6.64	6.58	6.58	6.58	6.58	6.53	6.53	6.53
180.0	6.64	6.64	6.64	6.58	6.58	6.53	6.53	6.53	6.53
225.0	6.64	6.64	6.64	6.58	6.58	6.58	6.53	6.53	6.47
270.0	6.69	6.64	6.64	6.58	6.58	6.58	6.58	6.53	6.53
315.0	6.64	6.58	6.58	6.58	6.53	6.58	6.53	6.53	6.53
360.0	6.69	6.64	6.64	6.64	6.58	6.58	6.58	6.58	6.58
C/γ(°)	81.0	82.0	83.0	84.0	85.0	86.0	87.0	88.0	89.0
0.0	6.58	6.53	6.53	6.53	6.53	6.53	6.58	6.41	6.41
45.0	6.47	6.47	6.47	6.41	6.41	6.36	6.36	6.36	6.36
90.0	6.47	6.47	6.41	6.41	6.47	6.41	6.36	6.41	6.36
135.0	6.53	6.53	6.53	6.58	6.53	6.41	6.36	6.41	6.41
180.0	6.53	6.53	6.53	6.58	6.53	6.41	6.41	6.41	6.41
225.0	6.47	6.47	6.47	6.47	6.47	6.41	6.41	6.36	6.36
270.0	6.53	6.53	6.47	6.47	6.47	6.47	6.47	6.41	6.41
315.0	6.47	6.47	6.47	6.47	6.47	6.47	6.47	6.41	6.41
360.0	6.58	6.53	6.53	6.53	6.53	6.53	6.58	6.41	6.41

Intensity data(cd)

C/γ(°)	90.0
0.0	6.41
45.0	6.36
90.0	6.36
135.0	6.41
180.0	6.41
225.0	6.36
270.0	6.41
315.0	6.36
360.0	6.41