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NATA

LumCAT: 3-1547-A3
Luminaire: 99.02.73.172+92.76.365.00
Report No: NATA0100
Test No: GC2018111511
LampCAT: OSRAM SOLERIQ S15
Lamp flux(lm): 2616.0
Number of Lamps: 1
Length(mm): 84
Phm Type: C

Voltage(V): 36.3000
Current(A): 0.5500
Power (W): 20.3280
PF: 0.0000
Ballast type: DC
Width(mm): 84
Height(mm): 0

Photometric Results

Lumens(lm): 2402.15
Efficiency(%): 91.83%
Lumens(lm)/Power(W): 118.22
Central intensity(cd): 4685.344
Maximum intensity(cd): 4686.469
Angle of maximum intensity: $C=0.0 \gamma=1.0$
Beam Angle(50%Imax): [C0/180]Total=40.1
[C90/270]Total=40.1
Field angle(10%Imax): [C0/180]Total=70.5
[C90/270]Total=70.5
Maximum s/h(1/2): C0_180=0.66 C90_270=0.66
Maximum s/h(1/4): C0_180=0.64 C90_270=0.64
Up flux rate of lamp(%): 0.00%
Down flux rate of lamp(%): 91.86%
Up flux rate of LUM(%): - -
Down flux rate of LUM(%): 100.00%
CIE Type : Direct lighting
Output flux ratio in π solid angle : 98.605%

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	4685.344	1.121	1.121	.043%	.047%
1.0	4686.469	8.969	10.09	.343%	.420%
2.0	4682.109	17.919	28.009	.685%	1.166%
3.0	4673.672	26.823	54.832	1.025%	2.283%
4.0	4662.141	35.663	90.496	1.363%	3.767%
5.0	4641.047	44.357	134.853	1.696%	5.614%
6.0	4599.773	52.726	187.578	2.016%	7.809%
7.0	4545.703	60.750	248.329	2.322%	10.338%
8.0	4473.844	68.279	316.608	2.610%	13.180%
9.0	4377.375	75.093	391.7	2.871%	16.306%
10.0	4254.328	81.013	472.713	3.097%	19.679%
11.0	4133.672	86.494	559.207	3.306%	23.279%
12.0	3995.016	91.085	650.293	3.482%	27.071%
13.0	3815.789	94.129	744.422	3.598%	30.990%
14.0	3630.023	96.302	840.724	3.681%	34.999%
15.0	3441.938	97.690	938.414	3.734%	39.066%
16.0	3227.414	97.554	1035.968	3.729%	43.127%
17.0	2993.836	95.988	1131.956	3.669%	47.123%
18.0	2785.922	94.407	1226.362	3.609%	51.053%
19.0	2565.422	91.591	1317.953	3.501%	54.866%
20.0	2352.516	88.234	1406.187	3.373%	58.539%
21.0	2152.547	84.593	1490.78	3.234%	62.060%
22.0	1963.547	80.662	1571.442	3.083%	65.418%
23.0	1791.211	76.750	1648.192	2.934%	68.613%
24.0	1615.641	72.063	1720.254	2.755%	71.613%
25.0	1449.077	67.157	1787.411	2.567%	74.409%
26.0	1320.159	63.463	1850.874	2.426%	77.051%
27.0	1213.073	60.393	1911.267	2.309%	79.565%
28.0	1074.495	55.318	1966.585	2.115%	81.868%
29.0	1008.984	53.642	2020.227	2.051%	84.101%
30.0	942.715	51.689	2071.917	1.976%	86.253%
31.0	859.261	48.531	2120.447	1.855%	88.273%
32.0	781.629	45.422	2165.869	1.736%	90.164%
33.0	705.839	42.157	2208.026	1.611%	91.919%
34.0	603.338	36.998	2245.023	1.414%	93.459%
35.0	490.240	30.836	2275.859	1.179%	94.743%
36.0	405.415	26.132	2301.991	.999%	95.830%
37.0	275.006	18.149	2320.14	.694%	96.586%

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
38.0	186.216	12.572	2332.712	.481%	97.109%
39.0	126.134	8.705	2341.417	.333%	97.472%
40.0	66.966	4.720	2346.137	.180%	97.668%
41.0	35.086	2.524	2348.661	.096%	97.773%
42.0	22.950	1.684	2350.345	.064%	97.843%
43.0	17.972	1.344	2351.689	.051%	97.899%
44.0	14.836	1.130	2352.819	.043%	97.946%
45.0	13.936	1.081	2353.9	.041%	97.991%
46.0	13.366	1.054	2354.954	.040%	98.035%
47.0	13.036	1.045	2356	.040%	98.079%
48.0	12.804	1.043	2357.043	.040%	98.122%
49.0	12.586	1.042	2358.085	.040%	98.166%
50.0	12.375	1.040	2359.125	.040%	98.209%
51.0	12.234	1.043	2360.167	.040%	98.252%
52.0	12.080	1.044	2361.211	.040%	98.296%
53.0	11.946	1.046	2362.257	.040%	98.339%
54.0	11.820	1.049	2363.306	.040%	98.383%
55.0	11.700	1.051	2364.357	.040%	98.427%
56.0	11.609	1.055	2365.412	.040%	98.471%
57.0	11.503	1.058	2366.47	.040%	98.515%
58.0	11.405	1.061	2367.531	.041%	98.559%
59.0	11.327	1.065	2368.596	.041%	98.603%
60.0	11.222	1.066	2369.661	.041%	98.647%
61.0	11.152	1.070	2370.731	.041%	98.692%
62.0	11.081	1.073	2371.804	.041%	98.737%
63.0	11.025	1.077	2372.881	.041%	98.781%
64.0	10.948	1.079	2373.96	.041%	98.826%
65.0	10.891	1.082	2375.043	.041%	98.871%
66.0	10.849	1.087	2376.129	.042%	98.917%
67.0	10.786	1.089	2377.218	.042%	98.962%
68.0	10.716	1.090	2378.308	.042%	99.007%
69.0	10.688	1.094	2379.402	.042%	99.053%
70.0	10.631	1.096	2380.497	.042%	99.099%
71.0	10.596	1.099	2381.596	.042%	99.144%
72.0	10.561	1.101	2382.698	.042%	99.190%
73.0	10.526	1.104	2383.801	.042%	99.236%
74.0	10.484	1.105	2384.906	.042%	99.282%
75.0	10.463	1.108	2386.015	.042%	99.328%

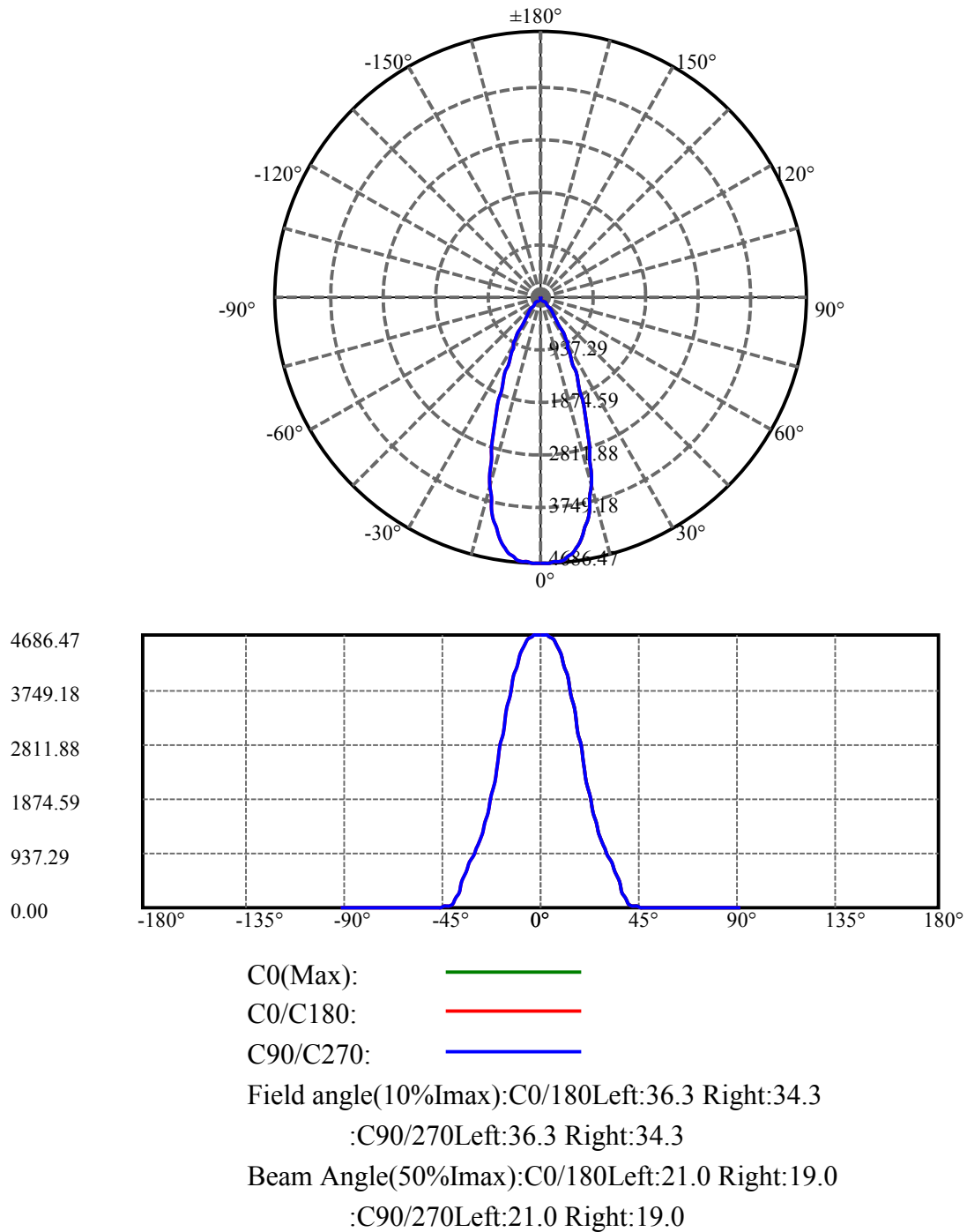
$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
76.0	10.420	1.109	2387.123	.042%	99.374%
77.0	10.399	1.111	2388.235	.042%	99.421%
78.0	10.364	1.112	2389.346	.042%	99.467%
79.0	10.343	1.113	2390.46	.043%	99.513%
80.0	10.308	1.113	2391.573	.043%	99.560%
81.0	10.294	1.115	2392.688	.043%	99.606%
82.0	10.280	1.116	2393.804	.043%	99.653%
83.0	10.238	1.114	2394.918	.043%	99.699%
84.0	10.230	1.116	2396.034	.043%	99.745%
85.0	10.202	1.115	2397.149	.043%	99.792%
86.0	10.181	1.114	2398.262	.043%	99.838%
87.0	10.153	1.112	2399.374	.043%	99.884%
88.0	10.139	1.111	2400.485	.042%	99.931%
89.0	10.139	1.112	2401.597	.042%	99.977%
90.0	10.111	0.554	2402.152	.021%	100.000%

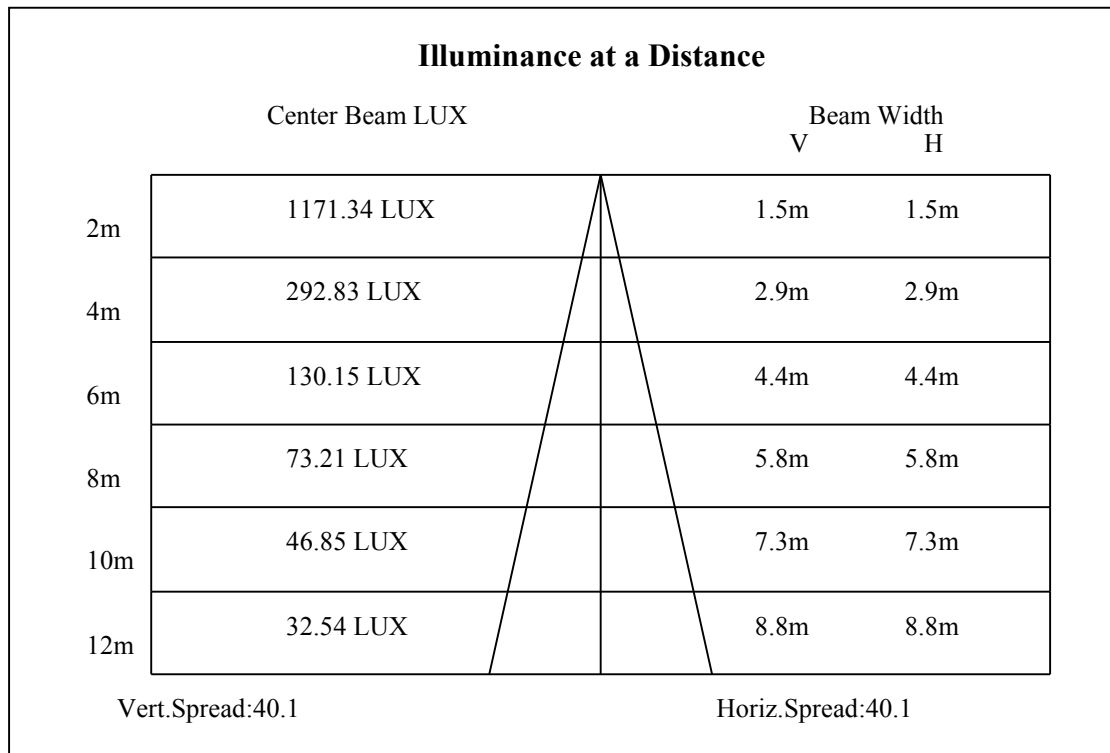
ZONAL LUMEN SUMMARY

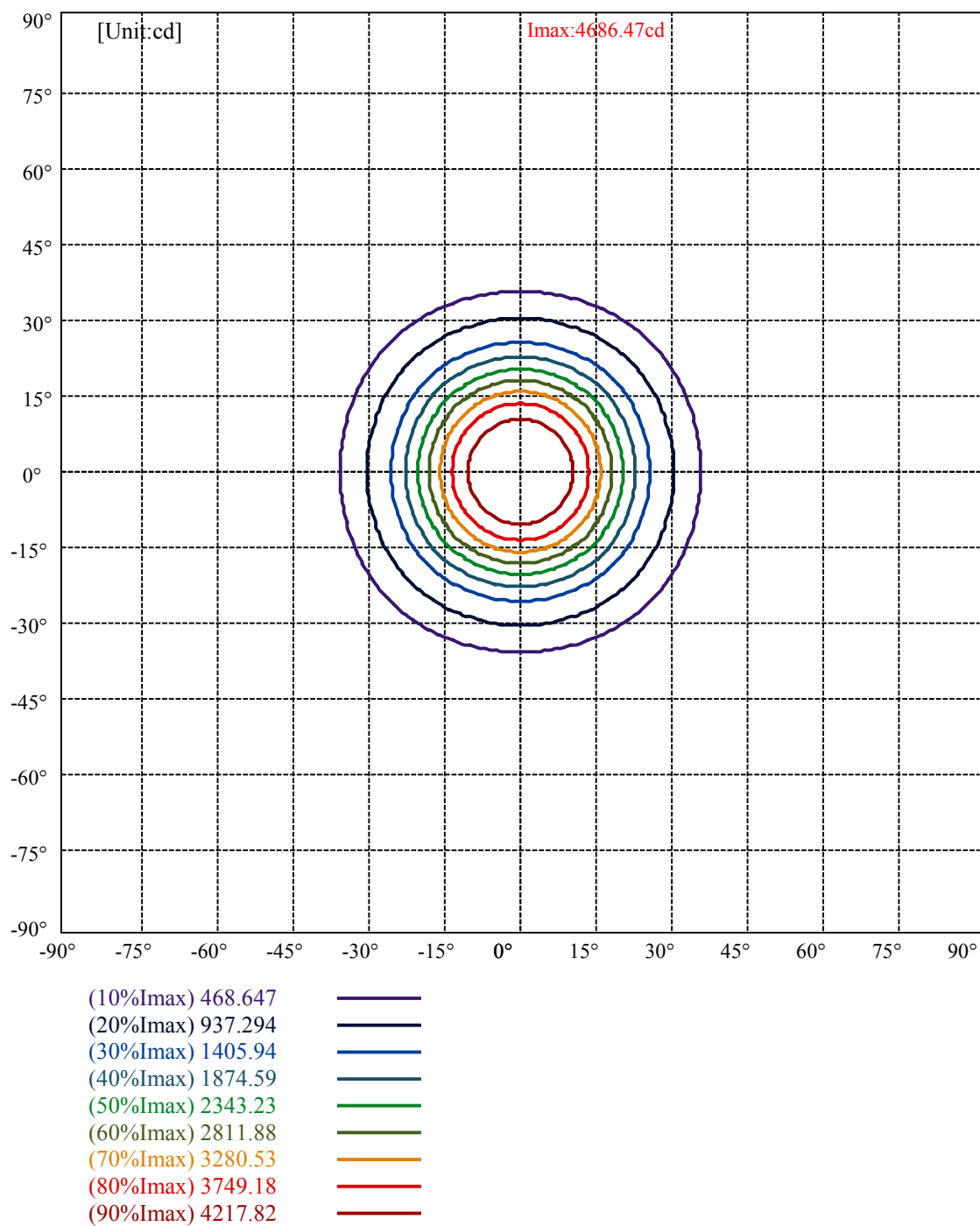
Zone	Lumens	%Lamp	%Fixt
0-30	2071.92	79.20%	86.25%
0-40	2346.14	89.68%	97.67%
0-60	2369.66	90.58%	98.65%
0-90	2401.60	91.80%	99.98%
0-120	2401.60	91.80%	99.98%
0-180	2402.15	91.83%	100.00%
60-90	33.00	1.26%	1.37%
90-120	0.00	0.00%	0.00%
90-130	0.00	0.00%	0.00%
90-150	0.00	0.00%	0.00%
90-180	0.00	0.00%	0.00%
0-27.19	1921.72	73.46%	80.00%

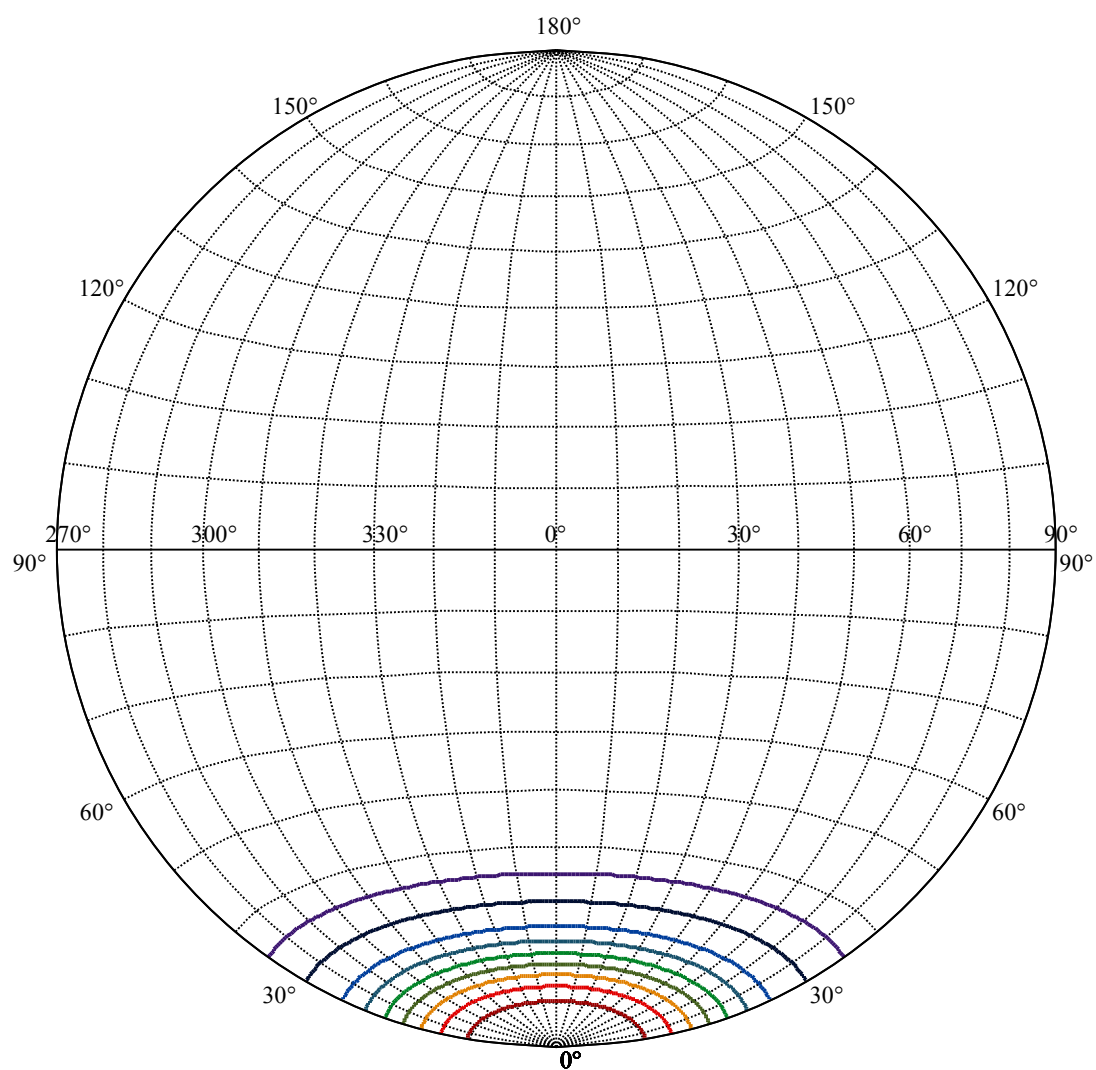
ZONAL LUMEN SUMMARY

0-10	472.71
10-20	933.47
20-30	665.73
30-40	274.22
40-50	12.99
50-60	10.54
60-70	10.84
70-80	11.08
80-90	10.02
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









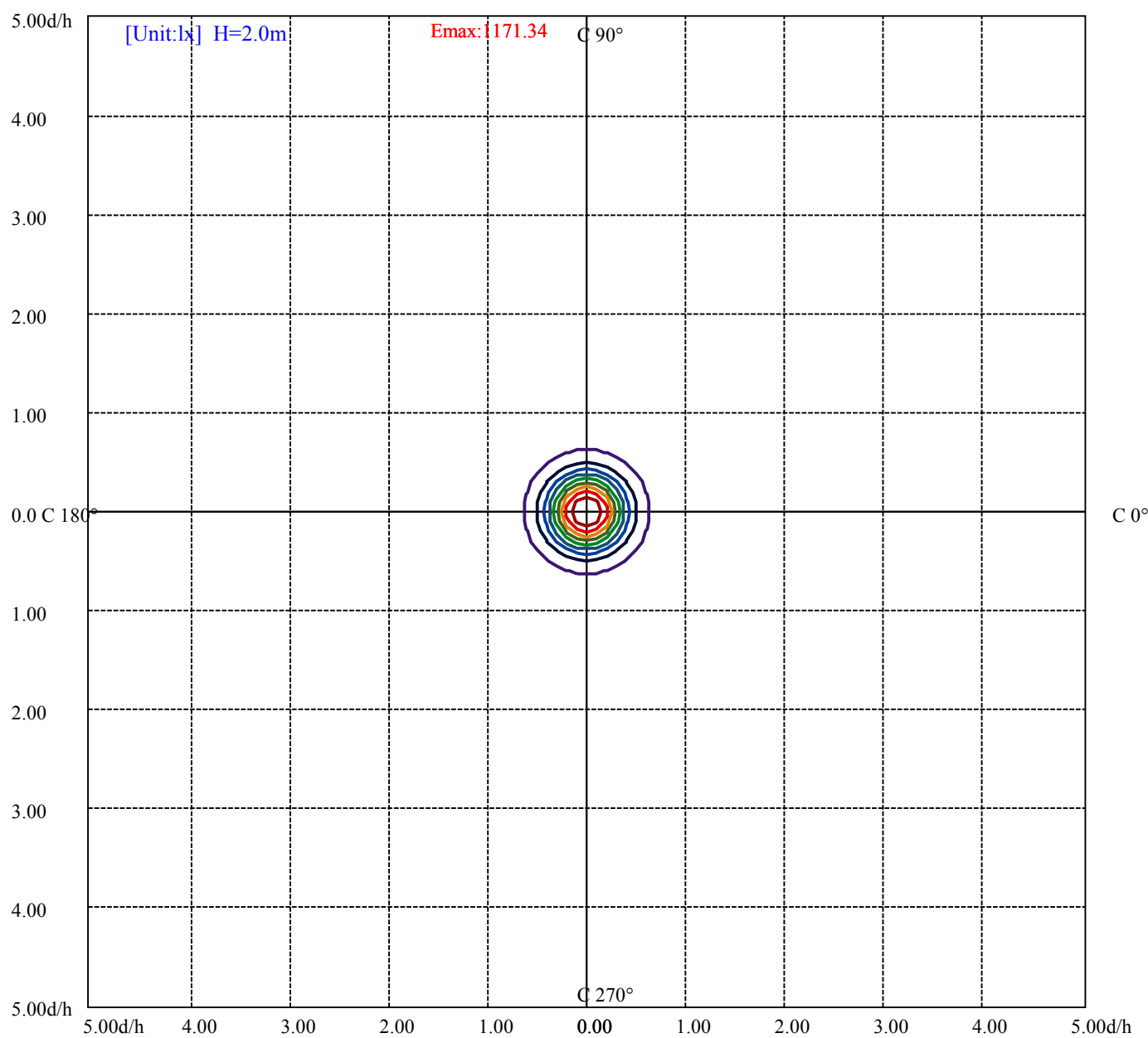
House

[Unit:cd]

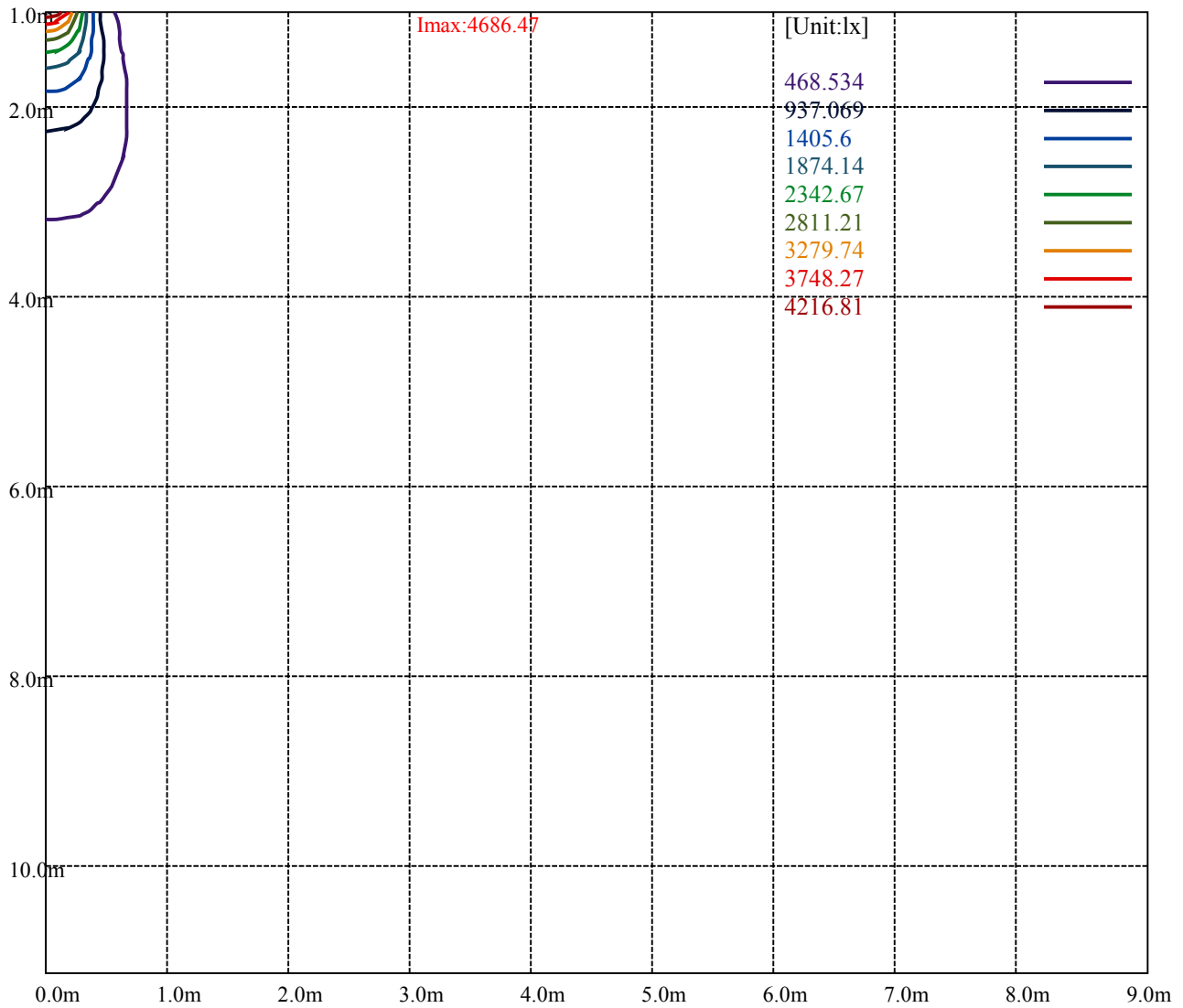
Road

Imax:4686.47

(10%Imax)	468.647	—
(20%Imax)	937.294	—
(30%Imax)	1405.94	—
(40%Imax)	1874.59	—
(50%Imax)	2343.23	—
(60%Imax)	2811.88	—
(70%Imax)	3280.53	—
(80%Imax)	3749.18	—
(90%Imax)	4217.82	—



(10%E _{max}) 117.1335	
(20%E _{max}) 234.2672	
(30%E _{max}) 351.4	
(40%E _{max}) 468.535	
(50%E _{max}) 585.6675	
(60%E _{max}) 702.8025	
(70%E _{max}) 819.935	
(80%E _{max}) 937.0675	
(90%E _{max}) 1054.203	



Luminance Table

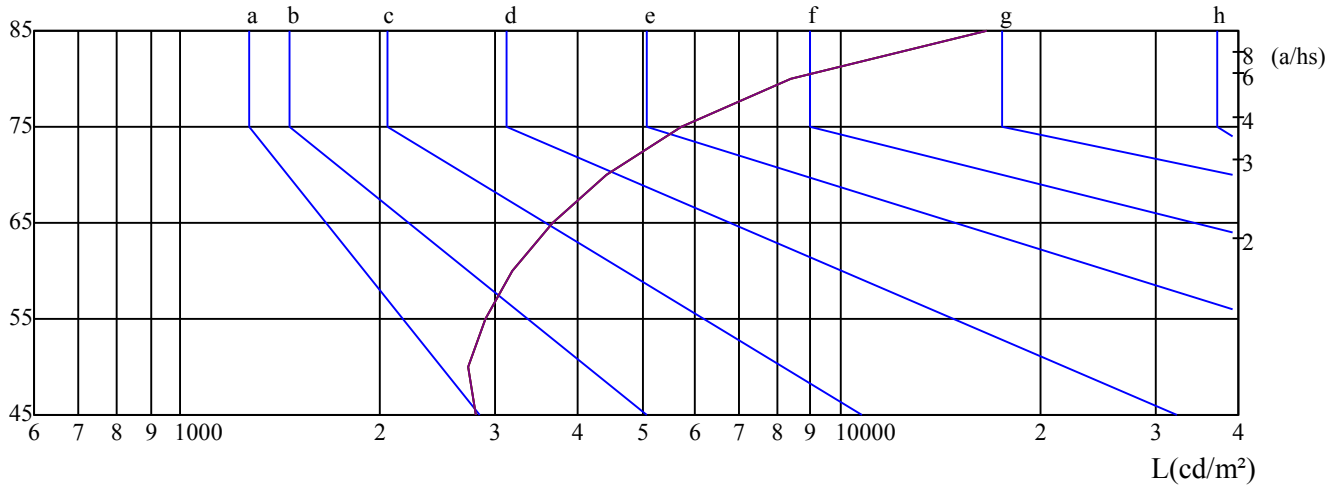
γ	45	50	55	60	65	70	75	80	85
C0	2793	2728	2891	3181	3652	4405	5729	8413	16590
C45	2793	2728	2891	3181	3652	4405	5729	8413	16590
C90	2793	2728	2891	3181	3652	4405	5729	8413	16590

L(Hor)(65)	L(Ver)(65)	L45(65)	L(Hor)(75)	L(Ver)(75)	L45(75)	L(Hor)(85)	L(Ver)(85)	L45(85)
3652	3652	3652	5729	5729	5729	16590	16590	16590

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

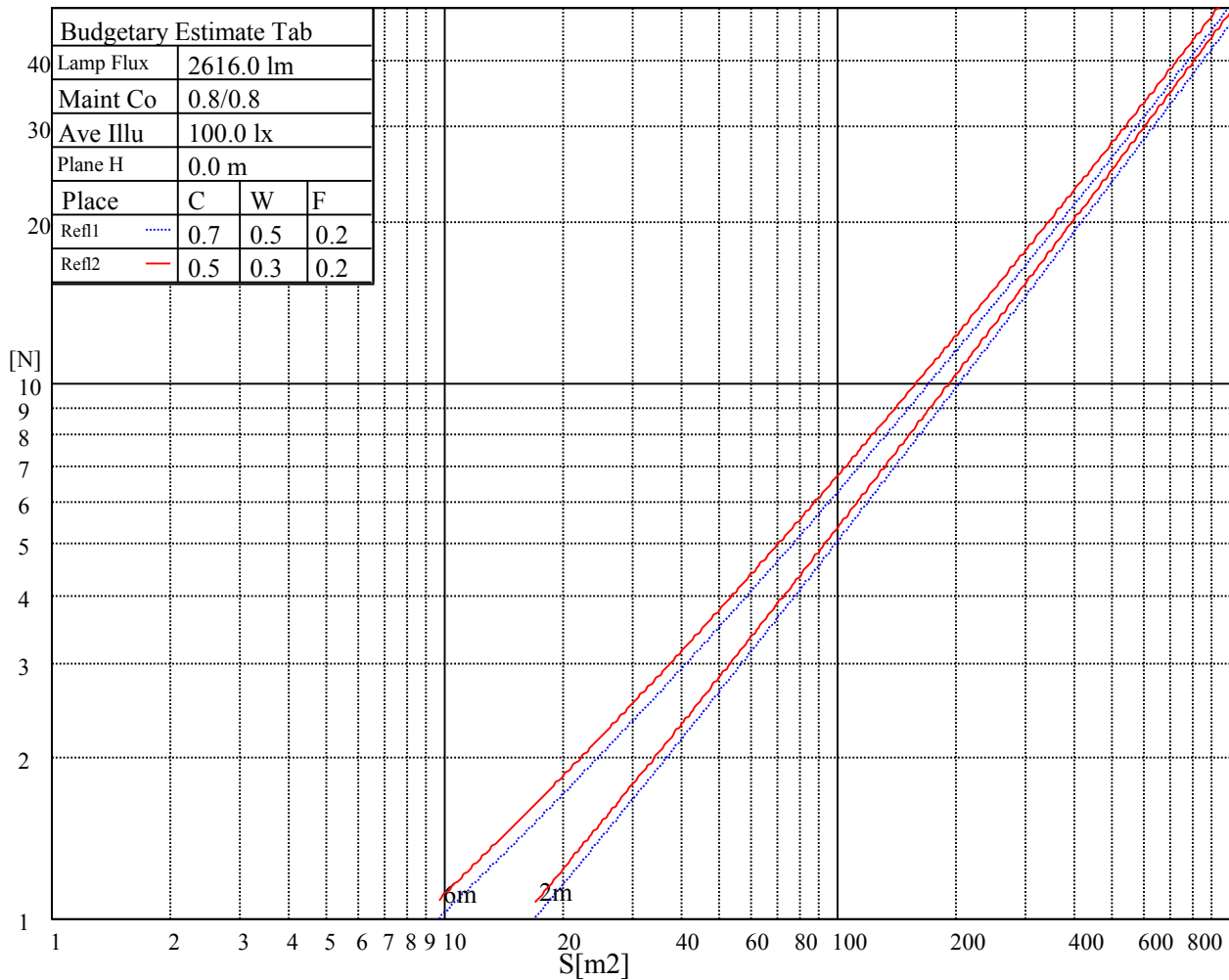
Luminance Limiting Curve

 $\gamma(^{\circ})$ 

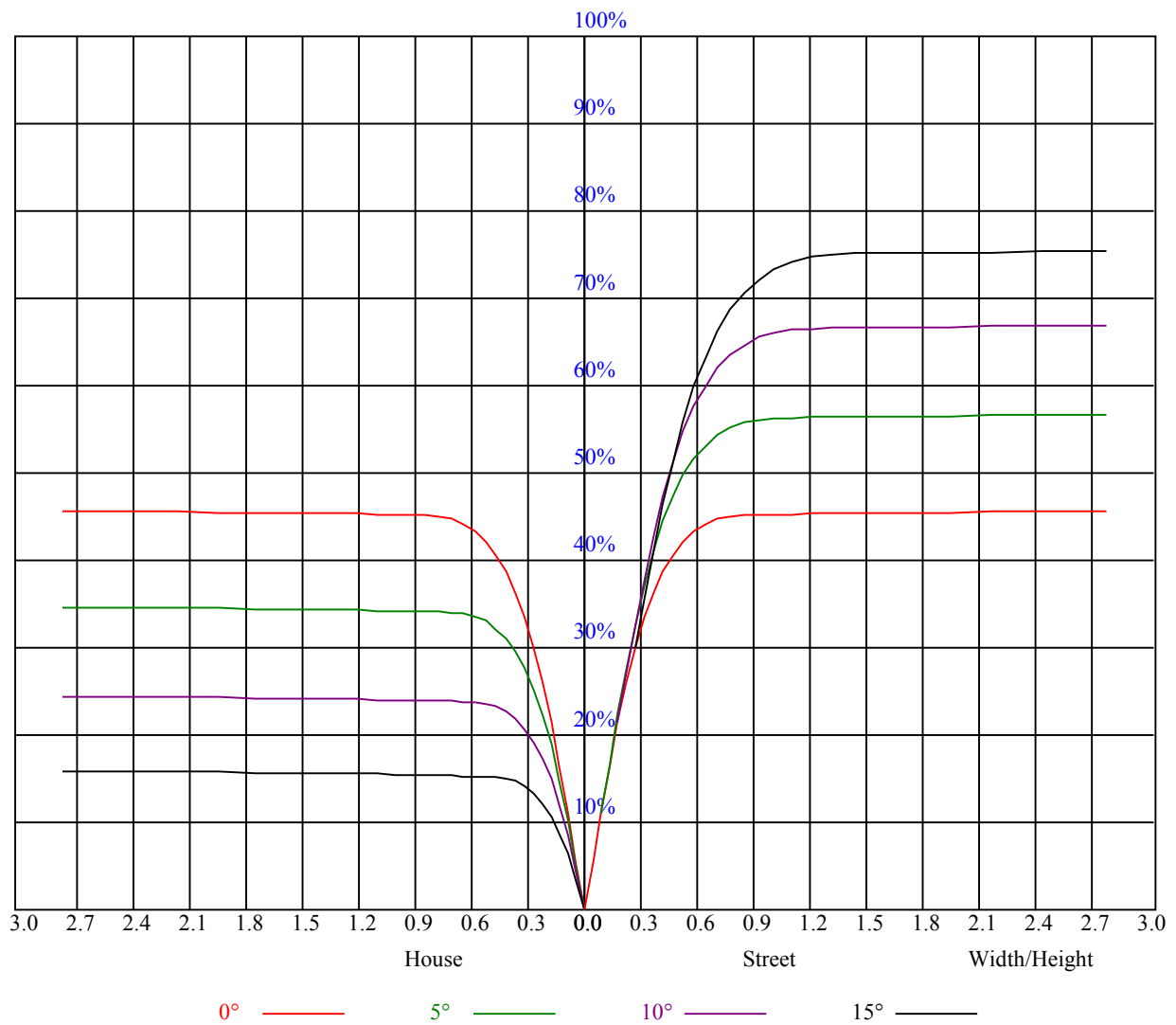
C0 ———

C45 ———

C90 ———



RHOC	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	1.09	1.09	1.09	1.07	1.07	1.07	1.02	1.02	1.02	0.98	0.98	0.98	0.94	0.94	0.94	0.92
1	1.02	1.00	0.98	1.00	0.99	0.97	0.97	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87
2	0.96	0.93	0.90	0.95	0.92	0.89	0.92	0.89	0.87	0.89	0.87	0.86	0.87	0.85	0.84	0.82
3	0.91	0.87	0.84	0.90	0.86	0.83	0.88	0.84	0.82	0.85	0.83	0.81	0.83	0.81	0.79	0.78
4	0.86	0.82	0.79	0.85	0.81	0.78	0.83	0.80	0.77	0.82	0.79	0.76	0.80	0.78	0.76	0.74
5	0.82	0.78	0.74	0.81	0.77	0.74	0.80	0.76	0.73	0.78	0.75	0.73	0.77	0.74	0.72	0.71
6	0.78	0.74	0.70	0.78	0.73	0.70	0.76	0.72	0.70	0.75	0.72	0.69	0.74	0.71	0.69	0.67
7	0.75	0.70	0.67	0.74	0.70	0.67	0.73	0.69	0.66	0.72	0.69	0.66	0.71	0.68	0.66	0.64
8	0.71	0.67	0.64	0.71	0.67	0.63	0.70	0.66	0.63	0.69	0.66	0.63	0.68	0.65	0.63	0.62
9	0.68	0.64	0.61	0.68	0.64	0.61	0.67	0.63	0.60	0.67	0.63	0.60	0.66	0.63	0.60	0.59
10	0.66	0.61	0.58	0.65	0.61	0.58	0.65	0.61	0.58	0.64	0.60	0.58	0.63	0.60	0.58	0.57



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	4698.00	4690.13	4672.13	4656.94	4648.50	4640.06	4627.13	4602.94	4548.94
45.0	4678.88	4658.63	4637.81	4616.44	4581.56	4527.56	4435.31	4354.31	4266.00
90.0	4673.81	4659.19	4645.69	4617.56	4581.00	4527.56	4437.00	4348.13	4241.81
135.0	4690.69	4689.00	4678.31	4656.94	4627.69	4586.63	4513.50	4442.06	4352.06
180.0	4698.00	4710.94	4720.50	4717.69	4702.50	4673.25	4625.44	4541.06	4443.19
225.0	4678.88	4699.69	4708.69	4726.13	4744.13	4748.63	4728.38	4685.63	4631.63
270.0	4673.81	4689.56	4701.94	4708.13	4720.50	4734.56	4746.38	4737.94	4709.25
315.0	4690.69	4694.63	4691.81	4689.56	4691.25	4690.13	4685.06	4653.56	4597.88
360.0	4698.00	4690.13	4672.13	4656.94	4648.50	4640.06	4627.13	4602.94	4548.94
C/ γ (°)	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0
0.0	4459.50	4372.31	4280.06	4170.38	4008.38	3854.25	3681.00	3467.81	3245.63
45.0	4146.75	4029.75	3898.69	3732.75	3537.56	3350.25	3135.38	2934.00	2703.94
90.0	4116.38	3942.00	3784.50	3610.69	3397.50	3179.81	2988.56	2772.56	2548.69
135.0	4232.81	4098.94	3963.94	3807.56	3590.44	3390.19	3184.31	2950.88	2709.00
180.0	4326.75	4159.69	4008.94	3841.31	3629.25	3405.38	3197.81	2955.94	2720.81
225.0	4563.00	4447.69	4336.88	4218.19	4088.81	3904.88	3728.81	3537.56	3278.81
270.0	4645.69	4557.38	4461.75	4350.94	4187.81	4041.00	3872.25	3660.19	3434.63
315.0	4532.81	4426.88	4334.63	4228.31	4086.56	3914.44	3747.38	3540.38	3309.19
360.0	4459.50	4372.31	4280.06	4170.38	4008.38	3854.25	3681.00	3467.81	3245.63
C/ γ (°)	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0
0.0	3044.25	2817.00	2587.50	2401.88	2206.69	2030.06	1830.94	1638.56	1485.56
45.0	2481.75	2300.06	2105.44	1906.88	1733.06	1559.25	1418.63	1275.75	1149.19
90.0	2356.31	2148.19	1970.44	1770.75	1585.13	1439.44	1296.00	1120.56	1076.57
135.0	2512.69	2297.25	2075.06	1889.44	1702.69	1552.50	1396.13	1258.31	1147.50
180.0	2522.25	2303.44	2111.06	1906.88	1712.81	1549.69	1384.88	1241.44	1118.64
225.0	3052.13	2833.31	2599.31	2388.38	2207.81	1996.88	1798.88	1641.38	1478.81
270.0	3229.31	2986.31	2751.75	2550.38	2348.44	2170.69	1975.50	1776.94	1608.75
315.0	3088.69	2837.81	2619.56	2405.81	2211.75	2031.19	1824.19	1639.69	1496.25
360.0	3044.25	2817.00	2587.50	2401.88	2206.69	2030.06	1830.94	1638.56	1485.56
C/ γ (°)	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0
0.0	1347.75	1200.94	1105.88	1023.19	945.56	897.19	848.25	758.25	644.63
45.0	1064.25	978.19	915.19	857.81	778.50	691.88	574.31	446.63	334.69
90.0	996.13	916.14	867.15	815.74	703.58	599.34	495.06	367.37	267.13
135.0	1071.56	964.69	902.81	853.31	768.94	676.13	584.44	453.38	330.19
180.0	1041.58	938.81	889.82	846.39	786.09	680.34	577.63	459.51	344.08
225.0	1344.94	1117.69	1094.68	1013.06	946.41	875.76	832.50	757.52	627.24
270.0	1472.63	1288.13	1176.19	1095.19	990.00	930.94	888.75	827.44	727.31
315.0	1365.75	1191.38	1120.16	1037.03	955.01	901.46	845.78	756.62	646.65
360.0	1347.75	1200.94	1105.88	1023.19	945.56	897.19	848.25	758.25	644.63
C/ γ (°)	36.0	37.0	38.0	39.0	40.0	41.0	42.0	43.0	44.0
0.0	538.88	416.81	295.88	232.65	89.21	43.88	28.58	20.48	15.64
45.0	293.63	120.54	60.36	32.85	25.54	17.33	14.74	13.95	13.44
90.0	170.78	69.58	39.94	26.89	19.13	15.75	14.91	13.73	13.44
135.0	292.50	129.83	61.26	32.51	24.81	18.00	14.63	13.95	13.33
180.0	243.79	141.36	66.83	34.14	24.98	18.17	14.79	14.12	13.44
225.0	532.80	413.38	286.20	175.67	98.49	44.66	28.86	20.98	15.24
270.0	635.06	500.63	379.69	285.19	155.36	74.59	36.84	25.99	18.45
315.0	535.89	407.93	299.59	189.17	98.21	48.32	30.26	20.59	15.69
360.0	538.88	416.81	295.88	232.65	89.21	43.88	28.58	20.48	15.64

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	14.63	13.78	13.33	13.05	12.77	12.54	12.38	12.15	12.04
45.0	13.16	12.83	12.66	12.43	12.32	12.15	12.04	11.93	11.76
90.0	13.22	12.77	12.54	12.43	12.26	12.09	11.98	11.87	11.76
135.0	13.11	12.83	12.66	12.49	12.32	12.15	12.04	11.93	11.81
180.0	13.16	12.88	12.60	12.49	12.32	12.21	12.09	11.93	11.81
225.0	14.34	13.78	13.39	13.05	12.83	12.60	12.38	12.26	12.09
270.0	15.08	14.23	13.73	13.33	12.99	12.83	12.66	12.43	12.26
315.0	14.79	13.84	13.39	13.16	12.88	12.43	12.32	12.15	12.04
360.0	14.63	13.78	13.33	13.05	12.77	12.54	12.38	12.15	12.04
C/ γ (°)	54.0	55.0	56.0	57.0	58.0	59.0	60.0	61.0	62.0
0.0	11.93	11.81	11.70	11.59	11.48	11.36	11.25	11.19	11.14
45.0	11.64	11.53	11.42	11.36	11.25	11.19	11.08	11.03	10.97
90.0	11.64	11.53	11.42	11.31	11.25	11.19	11.14	11.03	10.97
135.0	11.70	11.59	11.53	11.42	11.31	11.25	11.14	11.08	11.03
180.0	11.70	11.59	11.53	11.42	11.31	11.25	11.14	11.08	11.03
225.0	11.93	11.81	11.70	11.59	11.53	11.42	11.31	11.25	11.14
270.0	12.15	11.98	11.87	11.76	11.64	11.59	11.42	11.36	11.25
315.0	11.87	11.76	11.70	11.59	11.48	11.36	11.31	11.19	11.14
360.0	11.93	11.81	11.70	11.59	11.48	11.36	11.25	11.19	11.14
C/ γ (°)	63.0	64.0	65.0	66.0	67.0	68.0	69.0	70.0	71.0
0.0	11.08	10.97	10.91	10.86	10.80	10.74	10.74	10.69	10.63
45.0	10.91	10.86	10.74	10.74	10.69	10.63	10.58	10.52	10.52
90.0	10.91	10.80	10.80	10.74	10.69	10.63	10.58	10.52	10.52
135.0	10.97	10.91	10.86	10.80	10.74	10.69	10.69	10.63	10.58
180.0	10.97	10.91	10.86	10.86	10.74	10.69	10.69	10.63	10.58
225.0	11.08	11.03	10.97	10.91	10.86	10.74	10.69	10.63	10.63
270.0	11.19	11.14	11.08	11.03	10.97	10.86	10.80	10.74	10.69
315.0	11.08	10.97	10.91	10.86	10.80	10.74	10.74	10.69	10.63
360.0	11.08	10.97	10.91	10.86	10.80	10.74	10.74	10.69	10.63
C/ γ (°)	72.0	73.0	74.0	75.0	76.0	77.0	78.0	79.0	80.0
0.0	10.58	10.58	10.52	10.52	10.46	10.46	10.41	10.41	10.41
45.0	10.46	10.41	10.41	10.35	10.35	10.29	10.29	10.29	10.24
90.0	10.46	10.41	10.41	10.41	10.35	10.29	10.29	10.24	10.24
135.0	10.58	10.52	10.52	10.46	10.46	10.41	10.35	10.35	10.29
180.0	10.52	10.52	10.46	10.46	10.41	10.41	10.35	10.29	10.29
225.0	10.58	10.58	10.46	10.46	10.41	10.41	10.35	10.35	10.29
270.0	10.69	10.63	10.58	10.52	10.46	10.46	10.46	10.41	10.35
315.0	10.63	10.58	10.52	10.52	10.46	10.46	10.41	10.41	10.35
360.0	10.58	10.58	10.52	10.52	10.46	10.46	10.41	10.41	10.41
C/ γ (°)	81.0	82.0	83.0	84.0	85.0	86.0	87.0	88.0	89.0
0.0	10.35	10.35	10.29	10.29	10.29	10.24	10.24	10.24	10.18
45.0	10.24	10.24	10.18	10.13	10.13	10.13	10.07	10.07	10.07
90.0	10.24	10.18	10.18	10.18	10.13	10.13	10.07	10.07	10.13
135.0	10.29	10.29	10.24	10.24	10.18	10.18	10.18	10.13	10.13
180.0	10.29	10.29	10.24	10.24	10.18	10.18	10.18	10.13	10.13
225.0	10.24	10.24	10.18	10.18	10.18	10.13	10.13	10.13	10.13
270.0	10.35	10.29	10.29	10.29	10.24	10.24	10.18	10.18	10.18
315.0	10.35	10.35	10.29	10.29	10.29	10.24	10.18	10.18	10.18
360.0	10.35	10.35	10.29	10.29	10.29	10.24	10.24	10.24	10.18

Intensity data(cd)

Appendix Page: 18 Total:18

C/ γ (°)	90.0
0.0	10.13
45.0	10.07
90.0	10.13
135.0	10.13
180.0	10.13
225.0	10.07
270.0	10.13
315.0	10.13
360.0	10.13