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NATA

LumCAT: 2-1674-M
Luminaire: 92.70.131.00
Report No: NATA0100
Test No: GC2018111211
LampCAT: OSRAM SOLERIQ S15
Lamp flux(lm): 2582.0
Number of Lamps: 1
Length(mm): 71
Phm Type: C

Voltage(V): 36.1000
Current(A): 0.5500
Power (W): 19.8550
PF: 1.0000
Ballast type: DC
Width(mm): 71
Height(mm): 0

Photometric Results

Lumens(lm): 2321.11
Efficiency(%): 89.90%
Lumens(lm)/Power(W): 117.09
Central intensity(cd): 16256.250
Maximum intensity(cd): 16256.250
Angle of maximum intensity: $C=0.0$ $\gamma=0.0$
Beam Angle(50%Imax): [C0/180]Total=15.5
[C90/270]Total=15.5
Field angle(10%Imax): [C0/180]Total=31.4
[C90/270]Total=31.4
Maximum s/h(1/2): C0_180=0.27 C90_270=0.27
Maximum s/h(1/4): C0_180=0.26 C90_270=0.26
Up flux rate of lamp(%): 0.00%
Down flux rate of lamp(%): 90.04%
Up flux rate of LUM(%): - -
Down flux rate of LUM(%): 100.00%
CIE Type : Direct lighting
Output flux ratio in π solid angle : 98.572%

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	16256.250	3.889	3.889	.151%	.168%
1.0	16124.063	30.859	34.748	1.195%	1.497%
2.0	15675.469	59.992	94.74	2.323%	4.082%
3.0	14881.641	85.409	180.149	3.308%	7.761%
4.0	13725.000	104.990	285.139	4.066%	12.285%
5.0	12495.023	119.422	404.561	4.625%	17.430%
6.0	10661.484	122.209	526.77	4.733%	22.695%
7.0	9280.969	124.034	650.804	4.804%	28.039%
8.0	7710.469	117.676	768.48	4.558%	33.108%
9.0	6151.641	105.530	874.01	4.087%	37.655%
10.0	4808.250	91.561	965.57	3.546%	41.600%
11.0	3833.086	80.205	1045.775	3.106%	45.055%
12.0	3181.922	72.547	1118.322	2.810%	48.181%
13.0	2474.578	61.044	1179.366	2.364%	50.810%
14.0	2105.367	55.854	1235.22	2.163%	53.217%
15.0	1773.352	50.332	1285.552	1.949%	55.385%
16.0	1556.086	47.035	1332.587	1.822%	57.412%
17.0	1384.657	44.395	1376.981	1.719%	59.324%
18.0	1264.556	42.852	1419.834	1.660%	61.171%
19.0	1180.005	42.129	1461.962	1.632%	62.986%
20.0	1094.070	41.034	1502.997	1.589%	64.753%
21.0	1046.173	41.113	1544.11	1.592%	66.525%
22.0	1003.535	41.225	1585.335	1.597%	68.301%
23.0	962.838	41.256	1626.591	1.598%	70.078%
24.0	929.489	41.458	1668.049	1.606%	71.864%
25.0	900.921	41.753	1709.802	1.617%	73.663%
26.0	876.656	42.143	1751.944	1.632%	75.479%
27.0	855.970	42.614	1794.559	1.650%	77.315%
28.0	838.315	43.159	1837.718	1.672%	79.174%
29.0	821.426	43.671	1881.388	1.691%	81.056%
30.0	806.941	44.245	1925.633	1.714%	82.962%
31.0	790.214	44.631	1970.264	1.729%	84.885%
32.0	763.685	44.379	2014.643	1.719%	86.797%
33.0	725.892	43.354	2057.997	1.679%	88.664%
34.0	674.248	41.346	2099.343	1.601%	90.446%
35.0	605.784	38.103	2137.446	1.476%	92.087%
36.0	522.745	33.695	2171.141	1.305%	93.539%
37.0	438.898	28.965	2200.106	1.122%	94.787%

$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
38.0	358.896	24.231	2224.337	.938%	95.831%
39.0	259.193	17.887	2242.224	.693%	96.601%
40.0	186.342	13.135	2255.359	.509%	97.167%
41.0	124.664	8.969	2264.328	.347%	97.554%
42.0	70.263	5.156	2269.484	.200%	97.776%
43.0	39.720	2.971	2272.454	.115%	97.904%
44.0	25.088	1.911	2274.366	.074%	97.986%
45.0	20.187	1.565	2275.931	.061%	98.054%
46.0	17.873	1.410	2277.341	.055%	98.114%
47.0	15.335	1.230	2278.571	.048%	98.167%
48.0	13.978	1.139	2279.71	.044%	98.216%
49.0	12.832	1.062	2280.772	.041%	98.262%
50.0	12.263	1.030	2281.802	.040%	98.307%
51.0	11.953	1.019	2282.821	.039%	98.350%
52.0	11.679	1.009	2283.83	.039%	98.394%
53.0	11.433	1.001	2284.831	.039%	98.437%
54.0	11.222	0.996	2285.827	.039%	98.480%
55.0	11.032	0.991	2286.818	.038%	98.523%
56.0	10.849	0.986	2287.804	.038%	98.565%
57.0	10.695	0.984	2288.788	.038%	98.608%
58.0	10.526	0.979	2289.766	.038%	98.650%
59.0	10.385	0.976	2290.743	.038%	98.692%
60.0	10.202	0.969	2291.712	.038%	98.734%
61.0	10.104	0.969	2292.681	.038%	98.775%
62.0	10.005	0.969	2293.649	.038%	98.817%
63.0	9.914	0.969	2294.618	.038%	98.859%
64.0	9.844	0.970	2295.588	.038%	98.901%
65.0	9.802	0.974	2296.562	.038%	98.943%
66.0	9.759	0.978	2297.54	.038%	98.985%
67.0	9.703	0.979	2298.52	.038%	99.027%
68.0	9.647	0.981	2299.5	.038%	99.069%
69.0	9.633	0.986	2300.487	.038%	99.112%
70.0	9.598	0.989	2301.476	.038%	99.154%
71.0	9.563	0.992	2302.467	.038%	99.197%
72.0	9.527	0.994	2303.461	.038%	99.240%
73.0	9.499	0.996	2304.457	.039%	99.283%
74.0	9.464	0.998	2305.455	.039%	99.326%
75.0	9.457	1.002	2306.456	.039%	99.369%

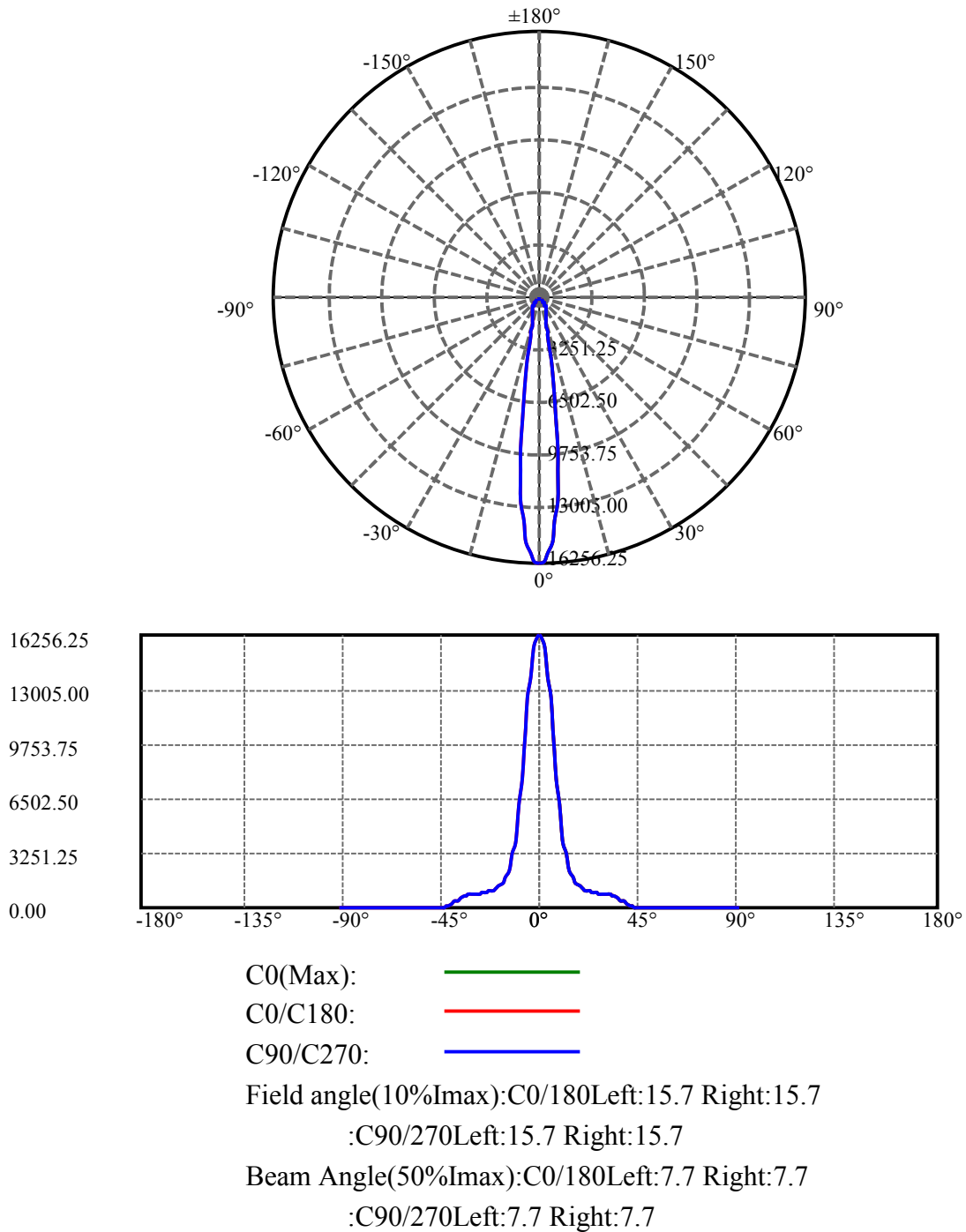
$\gamma(^{\circ})$	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
76.0	9.415	1.002	2307.458	.039%	99.412%
77.0	9.401	1.004	2308.463	.039%	99.455%
78.0	9.373	1.005	2309.468	.039%	99.499%
79.0	9.366	1.008	2310.476	.039%	99.542%
80.0	9.366	1.011	2311.488	.039%	99.586%
81.0	9.352	1.013	2312.5	.039%	99.629%
82.0	9.338	1.014	2313.514	.039%	99.673%
83.0	9.345	1.017	2314.531	.039%	99.717%
84.0	9.309	1.015	2315.547	.039%	99.760%
85.0	9.281	1.014	2316.561	.039%	99.804%
86.0	9.267	1.014	2317.574	.039%	99.848%
87.0	9.225	1.010	2318.585	.039%	99.891%
88.0	9.204	1.009	2319.593	.039%	99.935%
89.0	9.211	1.010	2320.603	.039%	99.978%
90.0	9.204	0.505	2321.108	.020%	100.000%

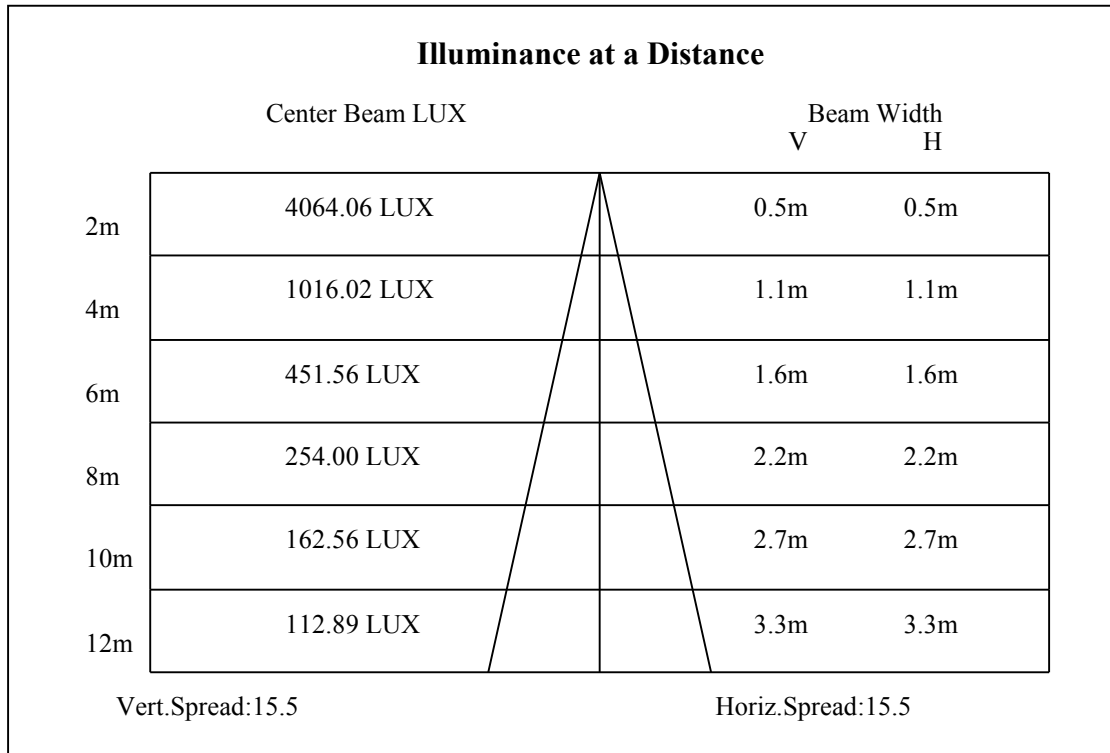
ZONAL LUMEN SUMMARY

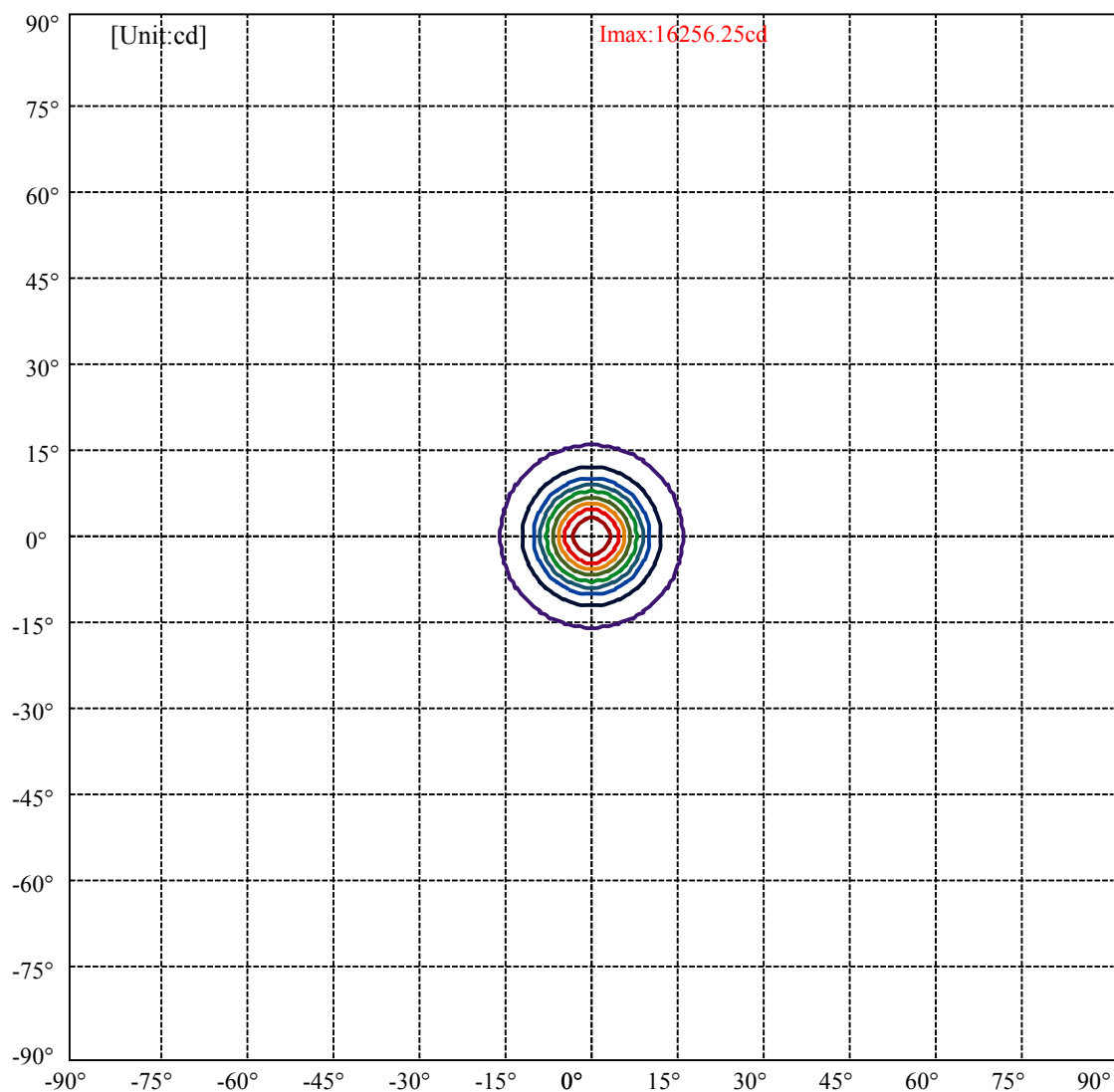
Zone	Lumens	%Lamp	%Fixt
0-30	1925.63	74.58%	82.96%
0-40	2255.36	87.35%	97.17%
0-60	2291.71	88.76%	98.73%
0-90	2320.60	89.88%	99.98%
0-120	2320.60	89.88%	99.98%
0-180	2321.11	89.90%	100.00%
60-90	29.86	1.16%	1.29%
90-120	0.00	0.00%	0.00%
90-130	0.00	0.00%	0.00%
90-150	0.00	0.00%	0.00%
90-180	0.00	0.00%	0.00%
0-28.44	1856.89	71.92%	80.00%

ZONAL LUMEN SUMMARY

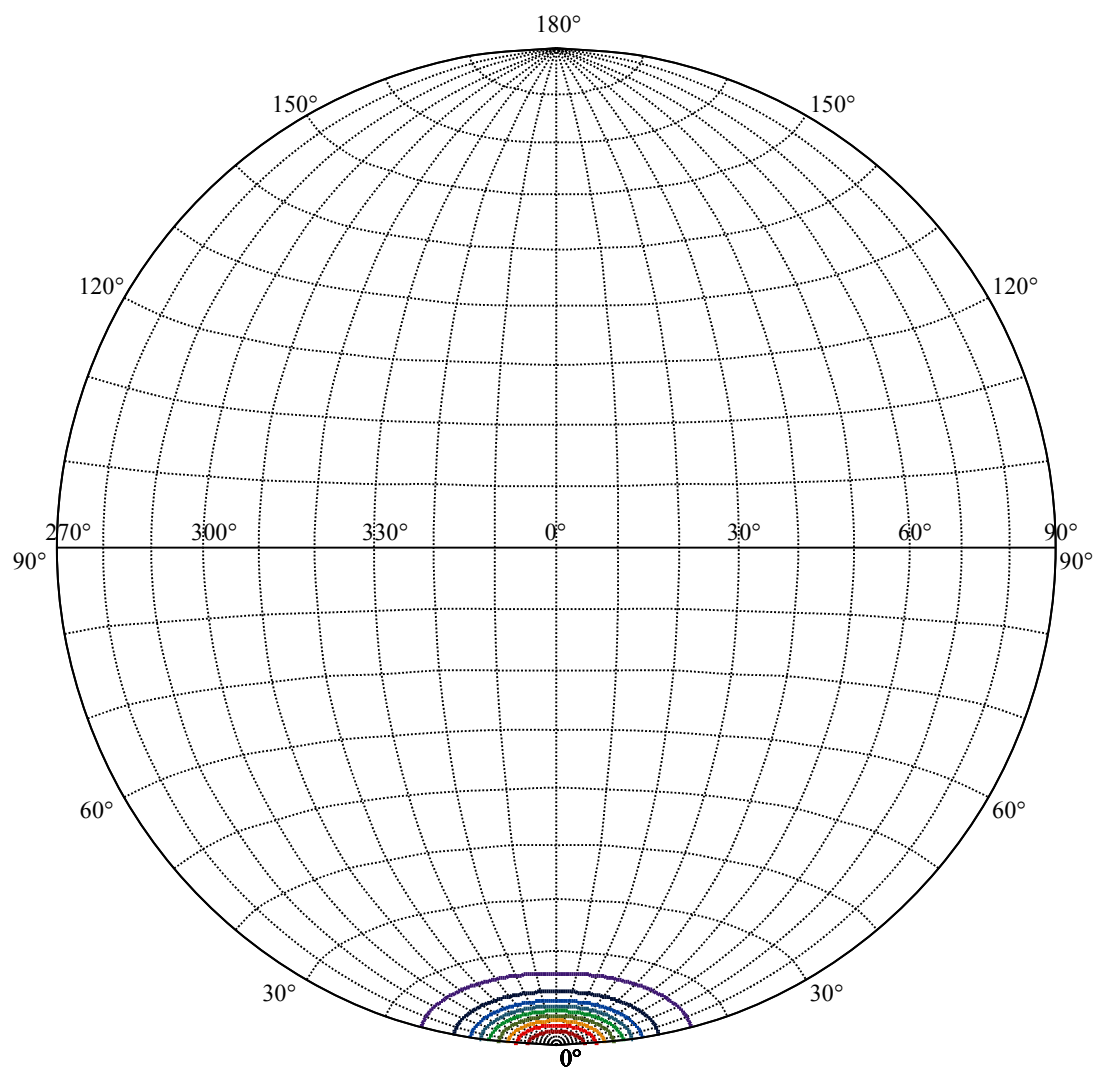
0-10	965.57
10-20	537.43
20-30	422.64
30-40	329.73
40-50	26.44
50-60	9.91
60-70	9.76
70-80	10.01
80-90	9.12
90-100	0.00
100-110	0.00
110-120	0.00
120-130	0.00
130-140	0.00
140-150	0.00
150-160	0.00
160-170	0.00
170-180	0.00







(10%Imax)	1625.63	—
(20%Imax)	3251.25	—
(30%Imax)	4876.88	—
(40%Imax)	6502.5	—
(50%Imax)	8128.13	—
(60%Imax)	9753.75	—
(70%Imax)	11379.4	—
(80%Imax)	13005	—
(90%Imax)	14630.6	—



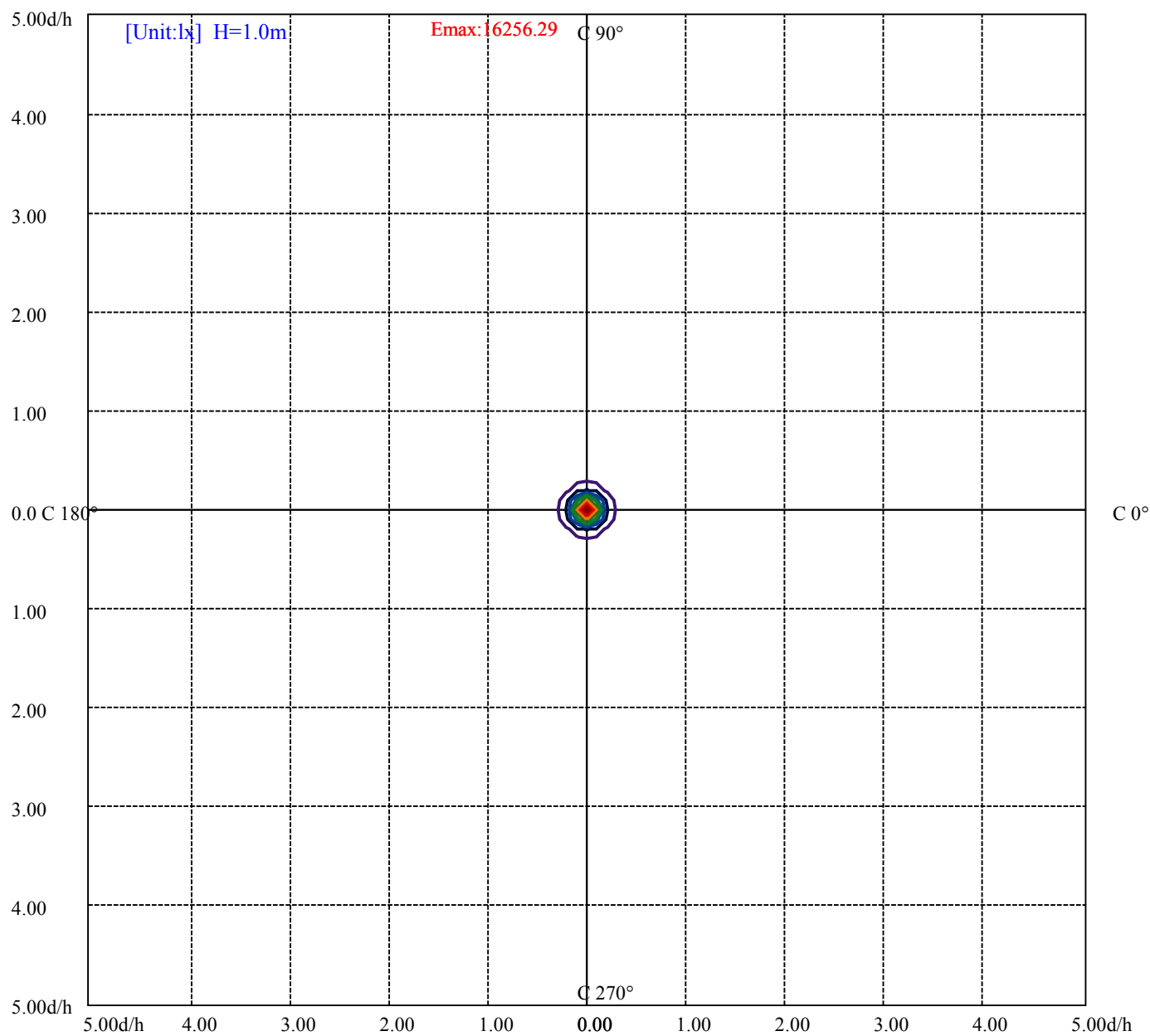
House

[Unit:cd]

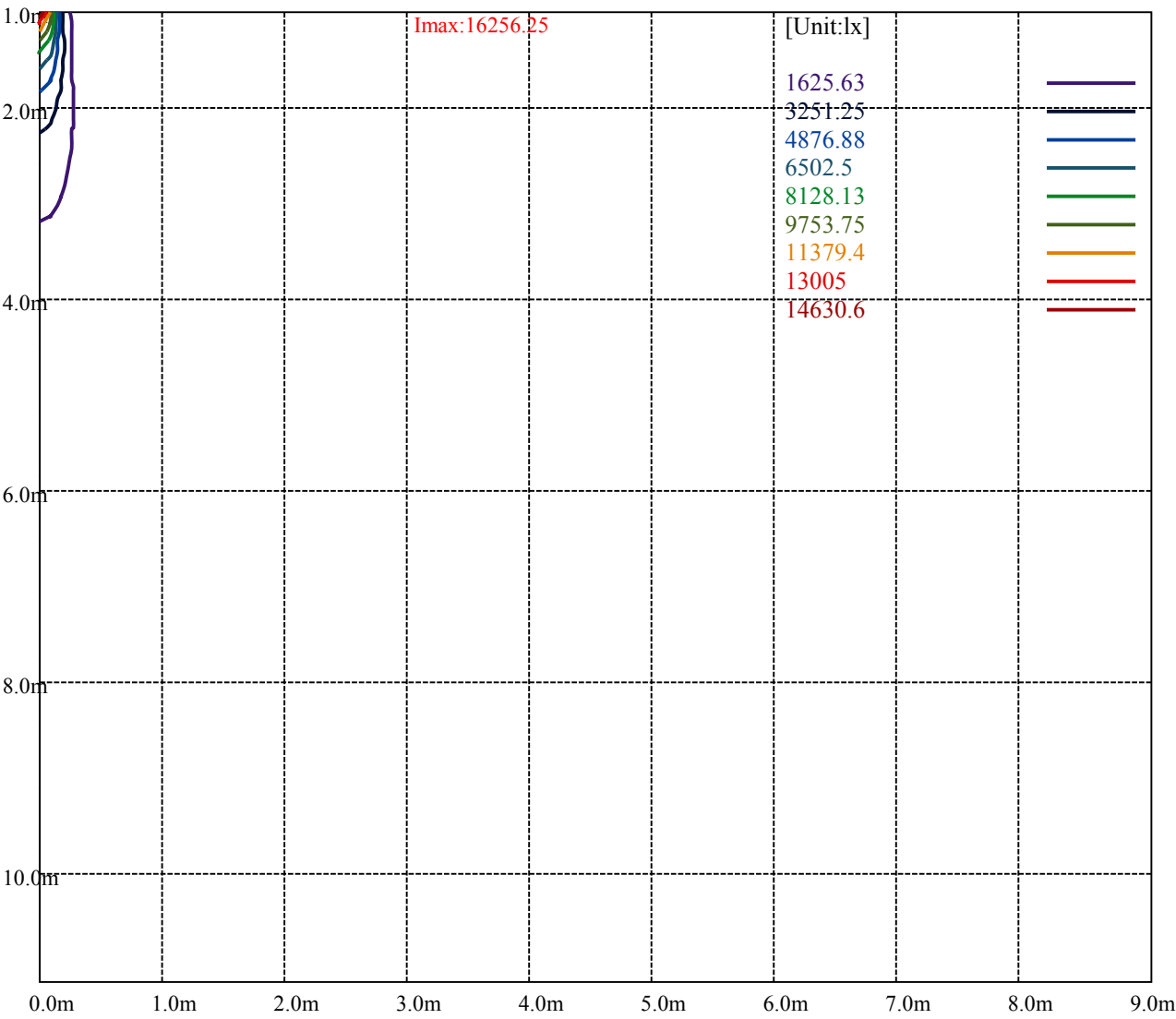
Road

Imax:16256.25

(10%Imax)	1625.63	—
(20%Imax)	3251.25	—
(30%Imax)	4876.88	—
(40%Imax)	6502.5	—
(50%Imax)	8128.13	—
(60%Imax)	9753.75	—
(70%Imax)	11379.4	—
(80%Imax)	13005	—
(90%Imax)	14630.6	—



(10%Emax)	1625.62	
(20%Emax)	3251.25	
(30%Emax)	4876.87	
(40%Emax)	6502.49	
(50%Emax)	8128.12	
(60%Emax)	9753.74	
(70%Emax)	11379.4	
(80%Emax)	13005	
(90%Emax)	14630.6	



Luminance Table

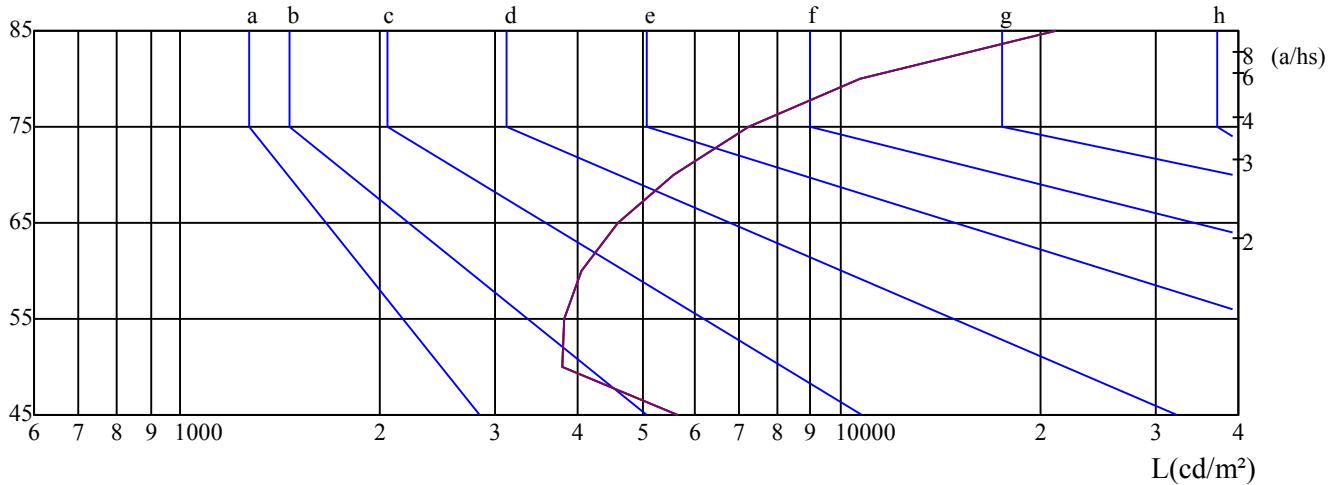
γ	45	50	55	60	65	70	75	80	85
C0	5663	3784	3815	4048	4601	5567	7248	10699	21125
C45	5663	3784	3815	4048	4601	5567	7248	10699	21125
C90	5663	3784	3815	4048	4601	5567	7248	10699	21125

L(Hor)(65)	L(Ver)(65)	L45(65)	L(Hor)(75)	L(Ver)(75)	L45(75)	L(Hor)(85)	L(Ver)(85)	L45(85)
4601	4601	4601	7248	7248	7248	21125	21125	21125

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

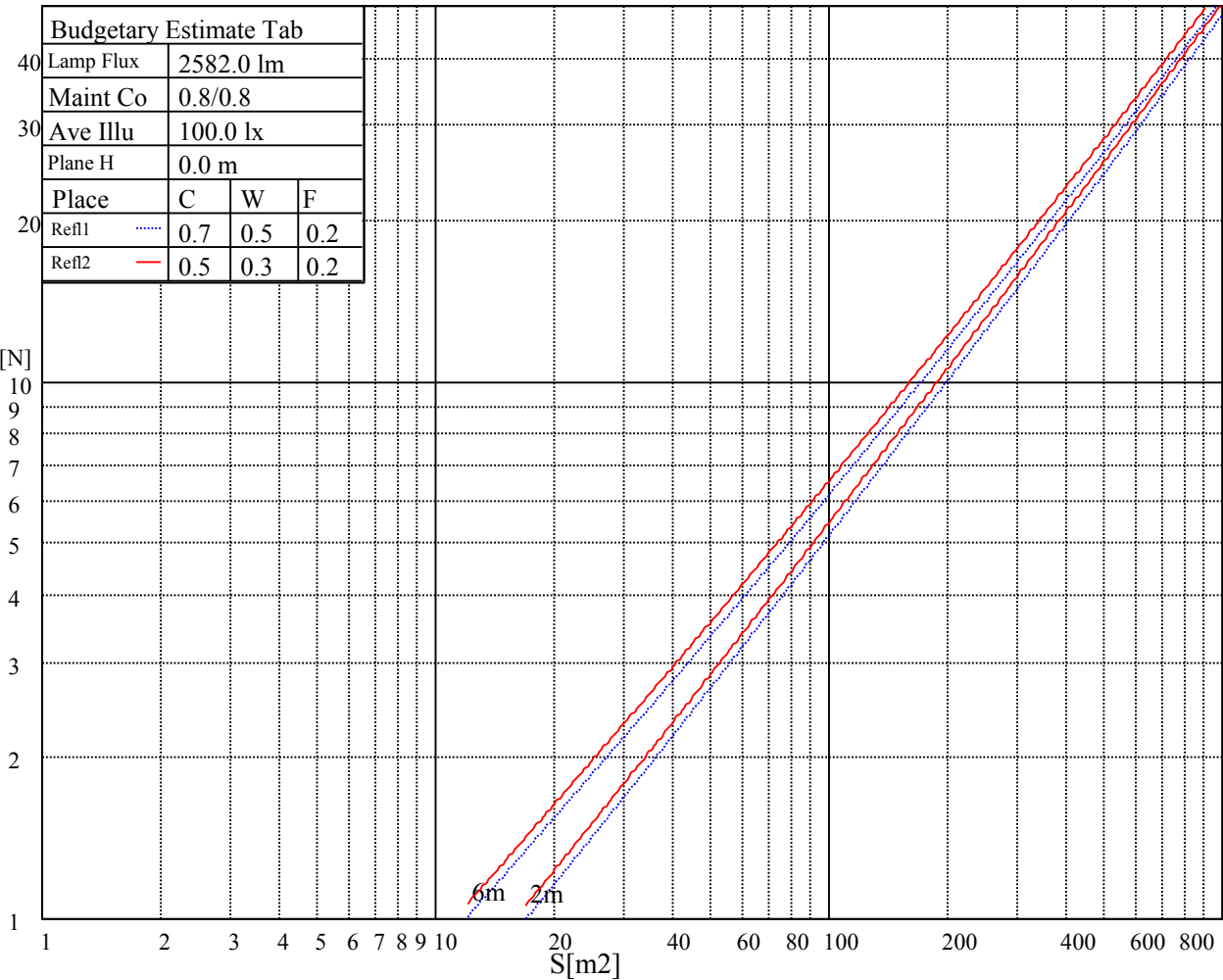
Luminance Limiting Curve

 $\gamma(^{\circ})$ 

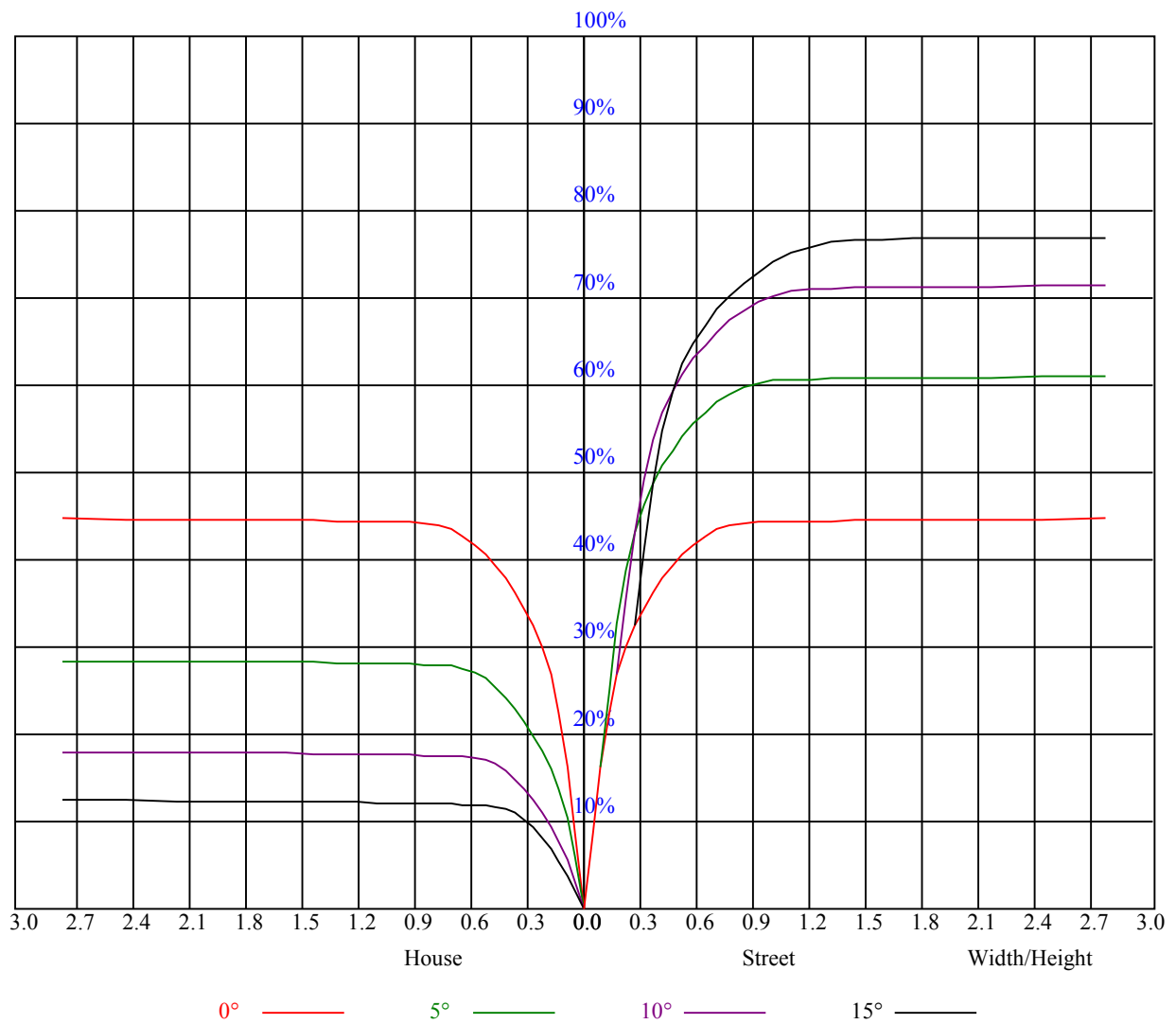
C0 ———

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	1.07	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	0.87	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	0.85	0.90	0.86	0.84	0.88	0.85	0.83	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	0.80	0.84	0.81	0.79	0.82	0.80	0.78	0.81	0.79	0.77	0.76
5	0.83	0.79	0.76	0.83	0.79	0.76	0.81	0.78	0.75	0.80	0.77	0.75	0.78	0.76	0.74	0.73
6	0.80	0.76	0.73	0.80	0.76	0.73	0.78	0.75	0.72	0.77	0.74	0.72	0.76	0.74	0.72	0.71
7	0.77	0.73	0.70	0.77	0.73	0.70	0.76	0.72	0.70	0.75	0.72	0.70	0.74	0.71	0.69	0.68
8	0.75	0.71	0.68	0.74	0.70	0.68	0.73	0.70	0.68	0.73	0.70	0.67	0.72	0.69	0.67	0.66
9	0.72	0.68	0.66	0.72	0.68	0.66	0.71	0.68	0.65	0.71	0.67	0.65	0.70	0.67	0.65	0.64
10	0.70	0.66	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



NATA 2-1674-M

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	16194.38	16363.13	16245.00	15828.75	15210.00	13798.13	12465.00	11171.25	9196.88		
45.0	16329.38	15941.25	15181.88	14169.38	12746.25	11272.50	9461.25	7666.88	6198.75		
90.0	16160.63	15693.75	14917.50	13505.63	11103.75	10489.50	8606.25	6799.50	5371.31		
135.0	16340.63	16014.38	15300.00	14371.88	12993.75	11356.88	9742.50	7908.75	6367.50		
180.0	16194.38	15811.88	15052.50	13944.38	12718.13	11069.44	9457.88	7642.13	6146.44		
225.0	16329.38	16391.25	16194.38	15615.00	14872.50	13876.88	11205.00	10830.38	9267.75		
270.0	16160.63	16391.25	16329.38	15997.50	15328.13	14315.63	13151.25	11593.13	10074.38		
315.0	16340.63	16385.63	16183.13	15620.63	14827.50	13781.25	11202.75	10635.75	9060.75		
360.0	16194.38	16363.13	16245.00	15828.75	15210.00	13798.13	12465.00	11171.25	9196.88		
C/ γ (°)	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0		
0.0	7441.88	6024.38	4668.75	3718.13	2998.13	2563.88	2007.00	1715.06	1505.25		
45.0	4764.38	3650.63	2925.00	2846.25	1934.44	1674.56	1484.44	1328.63	1211.06		
90.0	4070.25	3127.50	2535.75	2064.38	1766.81	1530.00	1361.25	1247.63	1118.19		
135.0	4860.00	3695.63	2947.50	2868.75	2023.88	1686.38	1497.38	1351.69	1211.06		
180.0	4734.00	3668.06	2975.06	2401.31	2028.38	1723.50	1504.13	1355.63	1240.31		
225.0	7717.50	5941.69	4745.81	3789.56	2926.69	2436.19	2073.38	1774.13	1553.06		
270.0	8313.75	6648.75	5343.75	4263.75	3262.50	2891.25	2284.88	1937.25	1681.31		
315.0	7311.38	5709.38	4523.06	3503.25	2855.81	2337.19	1974.38	1738.69	1557.00		
360.0	7441.88	6024.38	4668.75	3718.13	2998.13	2563.88	2007.00	1715.06	1505.25		
C/ γ (°)	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0		
0.0	1366.88	1260.56	1161.56	1100.25	1050.19	998.44	965.81	936.00	906.19		
45.0	1134.56	1069.31	1019.25	981.56	947.25	918.56	889.88	864.56	845.44		
90.0	1071.68	1024.48	988.03	950.23	922.84	896.51	874.97	849.94	834.13		
135.0	1130.63	1069.88	1014.19	977.63	947.25	911.81	886.50	866.25	847.13		
180.0	1114.65	1070.44	1023.69	978.69	949.89	921.26	893.03	868.89	850.89		
225.0	1404.00	1276.88	1172.25	1109.70	1049.12	1005.58	969.19	930.32	903.66		
270.0	1512.00	1393.88	1252.13	1172.81	1114.31	1044.56	995.63	963.56	923.63		
315.0	1382.06	1274.63	1121.46	1098.51	1047.43	1005.98	960.92	927.84	902.19		
360.0	1366.88	1260.56	1161.56	1100.25	1050.19	998.44	965.81	936.00	906.19		
C/ γ (°)	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0		
0.0	880.31	860.63	842.63	829.13	813.94	798.75	785.25	756.56	698.06		
45.0	830.81	813.38	799.31	784.69	765.56	734.06	675.56	595.69	509.06		
90.0	820.35	805.33	789.41	776.59	748.52	692.94	626.29	541.41	461.59		
135.0	831.38	819.00	803.81	789.19	772.88	739.69	678.38	595.69	507.94		
180.0	833.68	819.96	805.16	789.58	776.53	748.13	690.24	626.01	547.31		
225.0	880.88	856.29	840.32	826.43	811.58	796.11	782.94	761.12	709.65		
270.0	895.50	875.81	852.75	837.56	824.06	806.06	793.13	775.13	732.94		
315.0	874.86	856.13	838.01	822.38	808.65	793.74	775.35	742.39	679.73		
360.0	880.31	860.63	842.63	829.13	813.94	798.75	785.25	756.56	698.06		
C/ γ (°)	36.0	37.0	38.0	39.0	40.0	41.0	42.0	43.0	44.0		
0.0	632.25	554.06	443.81	351.56	285.75	180.06	98.72	51.47	28.29		
45.0	430.31	339.19	288.56	168.08	107.27	44.78	25.82	22.78	19.13		
90.0	368.78	276.13	199.13	120.32	60.36	31.67	22.84	20.03	17.38		
135.0	425.81	341.44	292.50	163.91	95.91	41.91	23.29	20.03	17.66		
180.0	428.29	349.03	264.60	176.23	101.98	53.49	28.13	22.56	19.74		
225.0	639.11	549.28	467.10	373.05	280.13	201.71	129.49	57.54	32.34		
270.0	673.88	600.19	496.69	408.94	331.88	289.69	144.56	84.21	40.16		
315.0	583.54	501.86	418.78	311.46	227.48	154.01	89.27	39.15	25.99		
360.0	632.25	554.06	443.81	351.56	285.75	180.06	98.72	51.47	28.29		

NATA 2-1674-M

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	23.29	20.19	16.71	14.68	12.83	12.32	11.98	11.64	11.42		
45.0	16.31	14.46	12.49	12.15	11.87	11.48	11.25	11.08	10.86		
90.0	15.47	14.18	12.71	12.38	12.09	11.81	11.53	11.31	11.14		
135.0	15.81	14.51	12.94	12.54	12.26	11.93	11.70	11.48	11.25		
180.0	16.76	15.47	13.67	12.77	12.49	12.15	11.87	11.59	11.42		
225.0	24.92	21.04	17.89	15.75	13.44	12.77	12.43	12.09	11.76		
270.0	25.93	23.29	19.58	16.65	14.40	12.99	12.60	12.26	11.93		
315.0	23.01	19.86	16.71	14.91	13.28	12.66	12.26	11.98	11.70		
360.0	23.29	20.19	16.71	14.68	12.83	12.32	11.98	11.64	11.42		
C/ γ (°)	54.0	55.0	56.0	57.0	58.0	59.0	60.0	61.0	62.0		
0.0	11.19	10.97	10.80	10.63	10.46	10.35	10.18	10.07	10.01		
45.0	10.69	10.58	10.41	10.29	10.18	10.07	9.90	9.90	9.79		
90.0	10.97	10.80	10.69	10.58	10.29	10.18	10.01	9.96	9.84		
135.0	11.08	10.91	10.69	10.52	10.41	10.24	10.07	10.01	9.96		
180.0	11.19	11.03	10.86	10.69	10.52	10.41	10.18	10.07	10.01		
225.0	11.53	11.31	11.08	10.91	10.74	10.58	10.41	10.29	10.13		
270.0	11.64	11.42	11.19	11.03	10.86	10.69	10.52	10.35	10.24		
315.0	11.48	11.25	11.08	10.91	10.74	10.58	10.35	10.18	10.07		
360.0	11.19	10.97	10.80	10.63	10.46	10.35	10.18	10.07	10.01		
C/ γ (°)	63.0	64.0	65.0	66.0	67.0	68.0	69.0	70.0	71.0		
0.0	9.90	9.79	9.79	9.73	9.68	9.62	9.62	9.56	9.56		
45.0	9.73	9.68	9.68	9.62	9.56	9.56	9.51	9.51	9.45		
90.0	9.79	9.79	9.73	9.73	9.68	9.62	9.62	9.56	9.56		
135.0	9.90	9.79	9.73	9.73	9.68	9.62	9.62	9.62	9.51		
180.0	9.90	9.84	9.79	9.73	9.68	9.62	9.62	9.56	9.56		
225.0	10.01	9.96	9.90	9.84	9.79	9.68	9.68	9.62	9.62		
270.0	10.13	10.01	9.96	9.90	9.84	9.79	9.79	9.73	9.68		
315.0	9.96	9.90	9.84	9.79	9.73	9.68	9.62	9.62	9.56		
360.0	9.90	9.79	9.79	9.73	9.68	9.62	9.62	9.56	9.56		
C/ γ (°)	72.0	73.0	74.0	75.0	76.0	77.0	78.0	79.0	80.0		
0.0	9.51	9.51	9.45	9.45	9.45	9.39	9.34	9.34	9.34		
45.0	9.45	9.39	9.39	9.39	9.34	9.34	9.34	9.28	9.34		
90.0	9.56	9.51	9.45	9.45	9.45	9.45	9.45	9.45	9.45		
135.0	9.51	9.51	9.45	9.45	9.39	9.39	9.34	9.34	9.34		
180.0	9.51	9.45	9.45	9.45	9.39	9.34	9.34	9.34	9.34		
225.0	9.56	9.51	9.45	9.45	9.39	9.39	9.34	9.34	9.34		
270.0	9.62	9.62	9.56	9.56	9.51	9.51	9.51	9.45	9.45		
315.0	9.51	9.51	9.51	9.45	9.39	9.39	9.34	9.39	9.34		
360.0	9.51	9.51	9.45	9.45	9.45	9.39	9.34	9.34	9.34		
C/ γ (°)	81.0	82.0	83.0	84.0	85.0	86.0	87.0	88.0	89.0		
0.0	9.34	9.28	9.34	9.34	9.28	9.34	9.28	9.23	9.23		
45.0	9.28	9.28	9.28	9.28	9.23	9.23	9.17	9.17	9.17		
90.0	9.45	9.51	9.51	9.34	9.23	9.23	9.23	9.23	9.23		
135.0	9.34	9.28	9.34	9.28	9.28	9.23	9.23	9.23	9.23		
180.0	9.34	9.28	9.28	9.23	9.23	9.23	9.17	9.17	9.23		
225.0	9.28	9.28	9.28	9.28	9.23	9.23	9.23	9.17	9.17		
270.0	9.45	9.45	9.45	9.45	9.51	9.39	9.28	9.23	9.23		
315.0	9.34	9.34	9.28	9.28	9.28	9.28	9.23	9.23	9.23		
360.0	9.34	9.28	9.34	9.34	9.28	9.34	9.28	9.23	9.23		

Intensity data(cd)

Appendix Page: 18 Total:18

C/ $\gamma(^{\circ})$	90.0
0.0	9.23
45.0	9.17
90.0	9.17
135.0	9.23
180.0	9.23
225.0	9.17
270.0	9.23
315.0	9.23
360.0	9.23