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NATA

LumCAT: 3-1545-A3
Luminaire: 99.02.73.172+92.76.365.00

Report No: NATA0100	Voltage(V): 36.2000
Test No: GC2018111516	Current(A): 0.5000
LampCAT: OSRAM OPTO SOLERIQ S13 G2	Power (W): 18.1000
Lamp flux(lm): 1689.0	PF: 0.0000
Number of Lamps: 1	Ballast type: DC
Length(mm): 84	Width(mm): 84
Phm Type: C	Height(mm): 0

Photometric Results

Lumens(lm): 1571.19
Efficiency(%): 93.02%
Lumens(lm)/Power(W): 87.04
Central intensity(cd): 17727.190
Maximum intensity(cd): 17727.190
Angle of maximum intensity: C=0.0 γ=0.0
Beam Angle(50%Imax): [C0/180]Total=11.8
[C90/270]Total=11.8
Field angle(10%Imax): [C0/180]Total=23.2
[C90/270]Total=23.2
Maximum s/h(1/2): C0_180=0.20 C90_270=0.20
Maximum s/h(1/4): C0_180=0.21 C90_270=0.21
Up flux rate of lamp(%): 0.00%
Down flux rate of lamp(%): 93.27%
Up flux rate of LUM(%): - -
Down flux rate of LUM(%): 100.00%
CIE Type : Direct lighting
Output flux ratio in π solid angle : 98.492%

Zonal flux distribution table

γ(°)	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	17727.188	4.241	4.241	.251%	.270%
1.0	17452.969	33.402	37.643	1.978%	2.396%
2.0	16600.781	63.533	101.176	3.762%	6.439%
3.0	15053.555	86.395	187.572	5.115%	11.938%
4.0	13307.203	101.794	289.366	6.027%	18.417%
5.0	10797.117	103.194	392.56	6.110%	24.985%
6.0	8654.273	99.201	491.762	5.873%	31.299%
7.0	6657.750	88.976	580.738	5.268%	36.962%
8.0	4908.305	74.910	655.648	4.435%	41.729%
9.0	3546.914	60.846	716.494	3.603%	45.602%
10.0	2573.227	49.000	765.494	2.901%	48.721%
11.0	2039.133	42.667	808.162	2.526%	51.436%
12.0	1588.613	36.220	844.382	2.144%	53.742%
13.0	1298.813	32.040	876.421	1.897%	55.781%
14.0	1106.909	29.366	905.787	1.739%	57.650%
15.0	993.417	28.195	933.982	1.669%	59.444%
16.0	911.201	27.543	961.525	1.631%	61.197%
17.0	849.171	27.226	988.751	1.612%	62.930%
18.0	798.933	27.073	1015.824	1.603%	64.653%
19.0	762.553	27.225	1043.049	1.612%	66.386%
20.0	728.796	27.334	1070.383	1.618%	68.126%
21.0	700.861	27.543	1097.927	1.631%	69.879%
22.0	678.241	27.862	1125.788	1.650%	71.652%
23.0	654.926	28.062	1153.851	1.661%	73.438%
24.0	632.658	28.218	1182.069	1.671%	75.234%
25.0	612.879	28.404	1210.473	1.682%	77.042%
26.0	595.350	28.620	1239.093	1.694%	78.864%
27.0	580.078	28.879	1267.972	1.710%	80.702%
28.0	567.802	29.232	1297.204	1.731%	82.562%
29.0	556.256	29.573	1326.777	1.751%	84.444%
30.0	545.808	29.927	1356.704	1.772%	86.349%
31.0	533.552	30.135	1386.839	1.784%	88.267%
32.0	504.155	29.297	1416.136	1.735%	90.132%
33.0	466.284	27.849	1443.985	1.649%	91.904%
34.0	411.827	25.254	1469.239	1.495%	93.511%
35.0	350.965	22.075	1491.314	1.307%	94.916%
36.0	259.495	16.726	1508.04	.990%	95.981%
37.0	192.164	12.682	1520.722	.751%	96.788%

Zonal flux distribution table

γ(°)	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
38.0	123.223	8.319	1529.042	.493%	97.318%
39.0	67.746	4.675	1533.717	.277%	97.615%
40.0	37.406	2.637	1536.354	.156%	97.783%
41.0	21.312	1.533	1537.887	.091%	97.881%
42.0	17.009	1.248	1539.135	.074%	97.960%
43.0	14.505	1.085	1540.22	.064%	98.029%
44.0	11.784	0.898	1541.117	.053%	98.086%
45.0	10.477	0.812	1541.93	.048%	98.138%
46.0	9.056	0.714	1542.644	.042%	98.183%
47.0	8.142	0.653	1543.297	.039%	98.225%
48.0	7.938	0.647	1543.944	.038%	98.266%
49.0	7.784	0.644	1544.588	.038%	98.307%
50.0	7.643	0.642	1545.23	.038%	98.348%
51.0	7.509	0.640	1545.87	.038%	98.389%
52.0	7.411	0.640	1546.511	.038%	98.430%
53.0	7.284	0.638	1547.149	.038%	98.470%
54.0	7.179	0.637	1547.786	.038%	98.511%
55.0	7.088	0.637	1548.422	.038%	98.551%
56.0	7.010	0.637	1549.06	.038%	98.592%
57.0	6.933	0.638	1549.697	.038%	98.632%
58.0	6.855	0.638	1550.335	.038%	98.673%
59.0	6.799	0.639	1550.974	.038%	98.714%
60.0	6.736	0.640	1551.613	.038%	98.754%
61.0	6.666	0.639	1552.253	.038%	98.795%
62.0	6.638	0.643	1552.895	.038%	98.836%
63.0	6.595	0.644	1553.54	.038%	98.877%
64.0	6.539	0.645	1554.184	.038%	98.918%
65.0	6.504	0.646	1554.831	.038%	98.959%
66.0	6.483	0.649	1555.48	.038%	99.000%
67.0	6.427	0.649	1556.129	.038%	99.042%
68.0	6.398	0.651	1556.78	.039%	99.083%
69.0	6.377	0.653	1557.432	.039%	99.125%
70.0	6.349	0.654	1558.087	.039%	99.166%
71.0	6.342	0.658	1558.744	.039%	99.208%
72.0	6.328	0.660	1559.404	.039%	99.250%
73.0	6.321	0.663	1560.067	.039%	99.292%
74.0	6.300	0.664	1560.731	.039%	99.335%
75.0	6.293	0.667	1561.398	.039%	99.377%

Zonal flux distribution table

γ(°)	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
76.0	6.272	0.667	1562.065	.040%	99.419%
77.0	6.265	0.669	1562.735	.040%	99.462%
78.0	6.258	0.671	1563.406	.040%	99.505%
79.0	6.237	0.671	1564.077	.040%	99.548%
80.0	6.230	0.673	1564.75	.040%	99.590%
81.0	6.216	0.673	1565.423	.040%	99.633%
82.0	6.223	0.676	1566.099	.040%	99.676%
83.0	6.216	0.677	1566.775	.040%	99.719%
84.0	6.216	0.678	1567.453	.040%	99.762%
85.0	6.237	0.681	1568.135	.040%	99.806%
86.0	6.230	0.681	1568.816	.040%	99.849%
87.0	6.209	0.680	1569.496	.040%	99.892%
88.0	6.173	0.677	1570.173	.040%	99.935%
89.0	6.159	0.675	1570.848	.040%	99.978%
90.0	6.166	0.338	1571.186	.020%	100.000%

Zonal flux distribution table

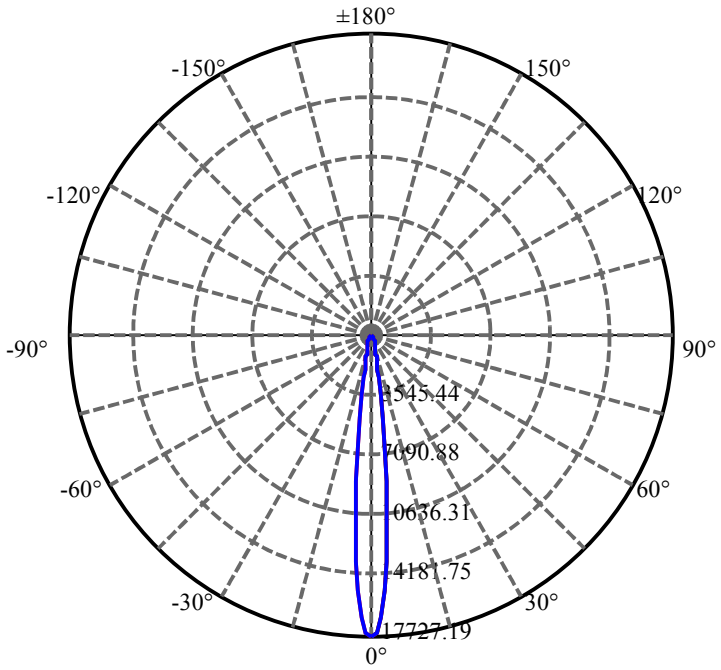
ZONAL LUMEN SUMMARY

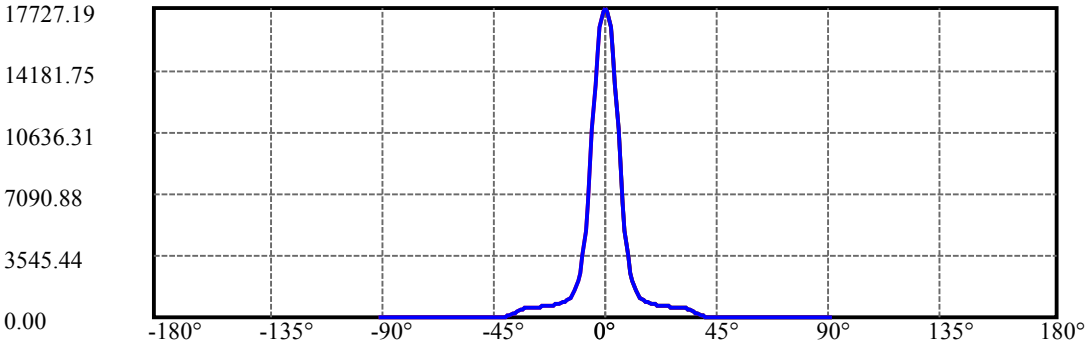
Zone	Lumens	%Lamp	%Fixt
0-30	1356.70	80.33%	86.35%
0-40	1536.35	90.96%	97.78%
0-60	1551.61	91.87%	98.75%
0-90	1570.85	93.00%	99.98%
0-120	1570.85	93.00%	99.98%
0-180	1571.19	93.02%	100.00%
60-90	19.87	1.18%	1.26%
90-120	0.00	0.00%	0.00%
90-130	0.00	0.00%	0.00%
90-150	0.00	0.00%	0.00%
90-180	0.00	0.00%	0.00%
0-26.62	1256.95	74.42%	80.00%

ZONAL LUMEN SUMMARY

0-10	765.49
10-20	304.89
20-30	286.32
30-40	179.65
40-50	8.88
50-60	6.38
60-70	6.47
70-80	6.66
80-90	6.10
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

Light Distribution Curve [Unit:cd]





C0(Max):

C0/C180:

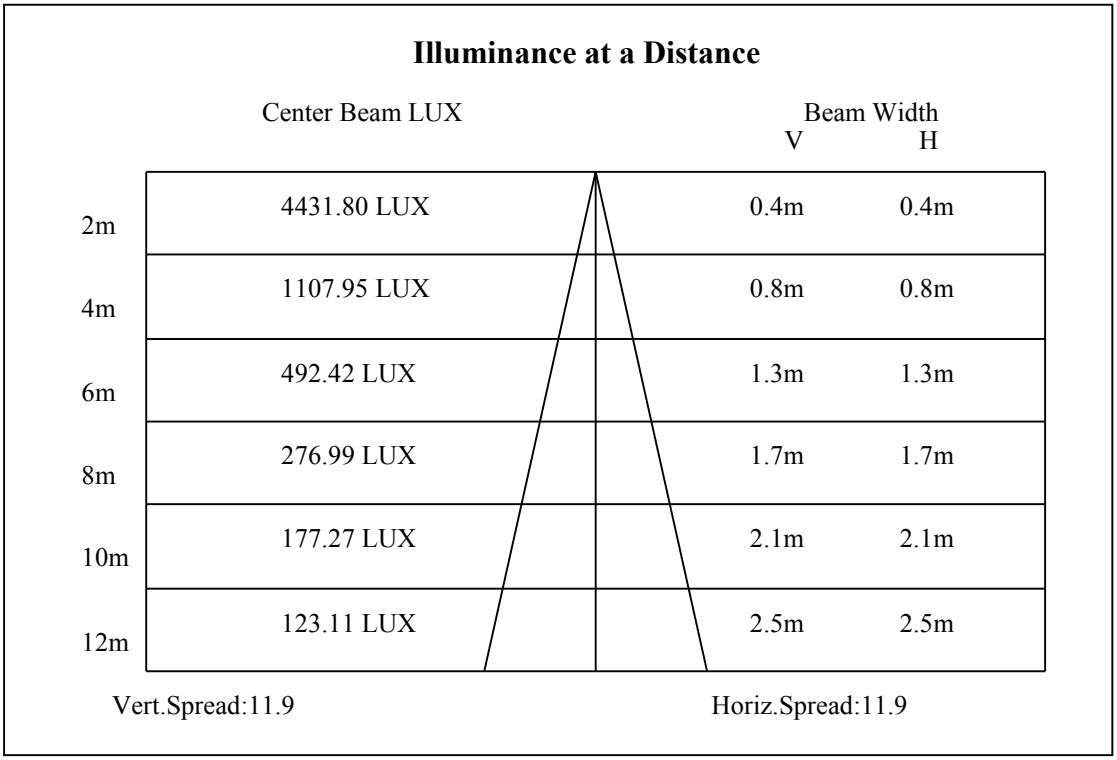
C90/C270:

Field angle(10%Imax):C0/180Left:11.6 Right:11.6
:C90/270Left:11.6 Right:11.6

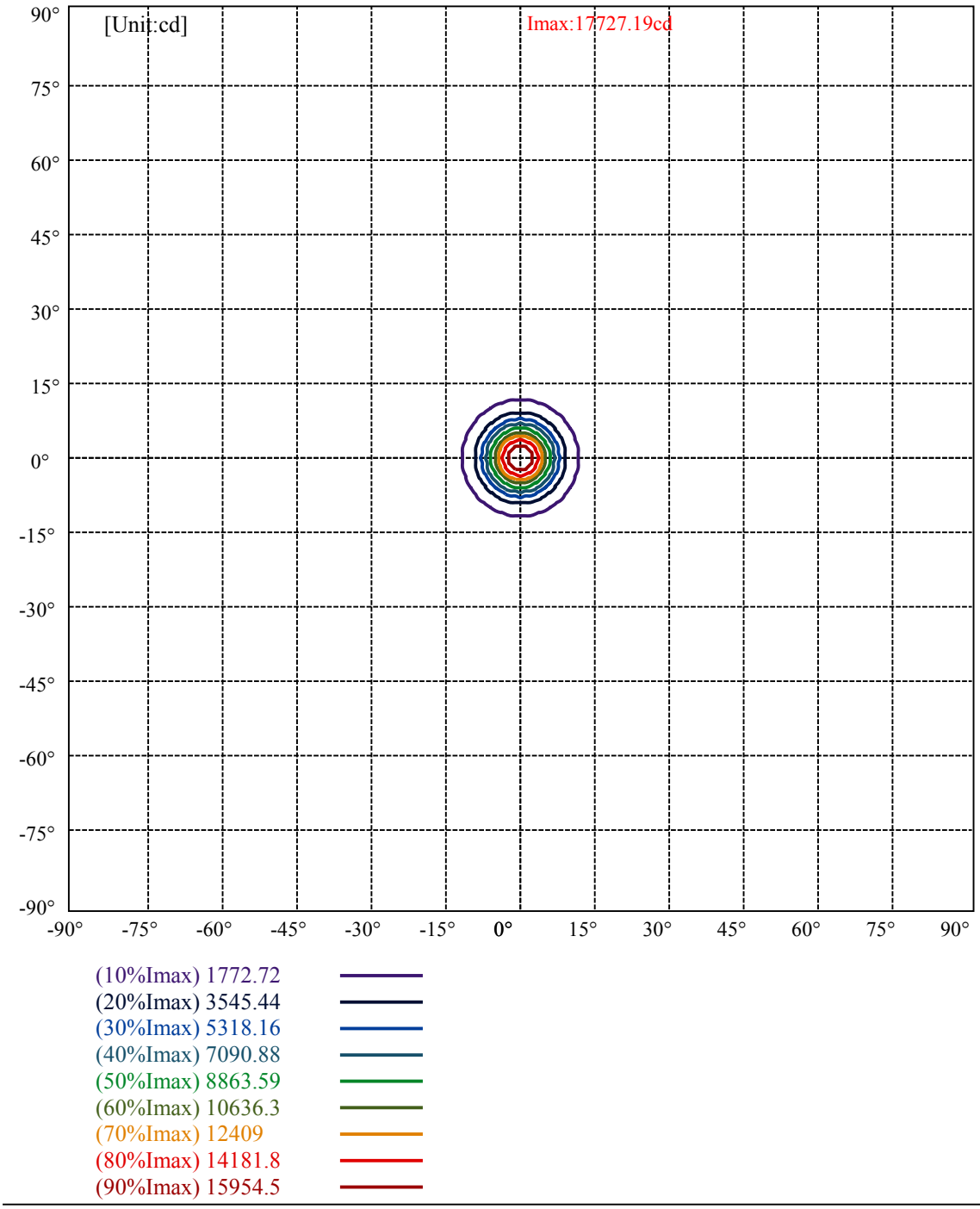
Beam Angle(50%Imax):C0/180Left:5.9 Right:5.9
:C90/270Left:5.9 Right:5.9

Equipment: GMS1980 Date: 2018/11/15 Operator: NT07
Temperature(°C): 25.0 Humidity(%): 65.0% Distance(m): 7.50

Lux distance Curve



ISO-Intensity(V-H)

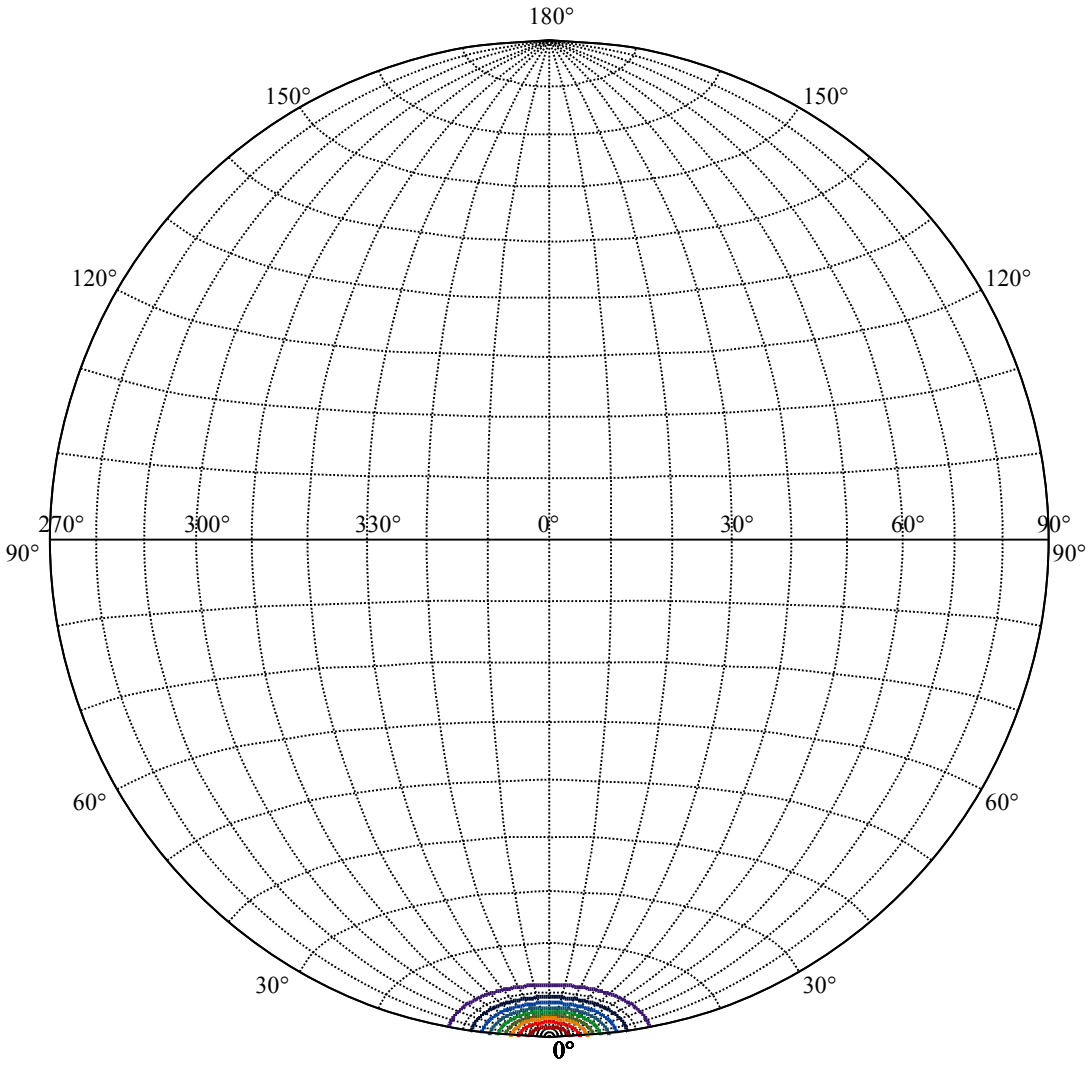


Equipment: GMS1980
Temperature(°C): 25.0

Date: 2018/11/15
Humidity(%): 65.0%

Operator: NT07
Distance(m): 7.50

ISO candela diagram on circular web



House [Unit:cd] Road

Imax:17727.19

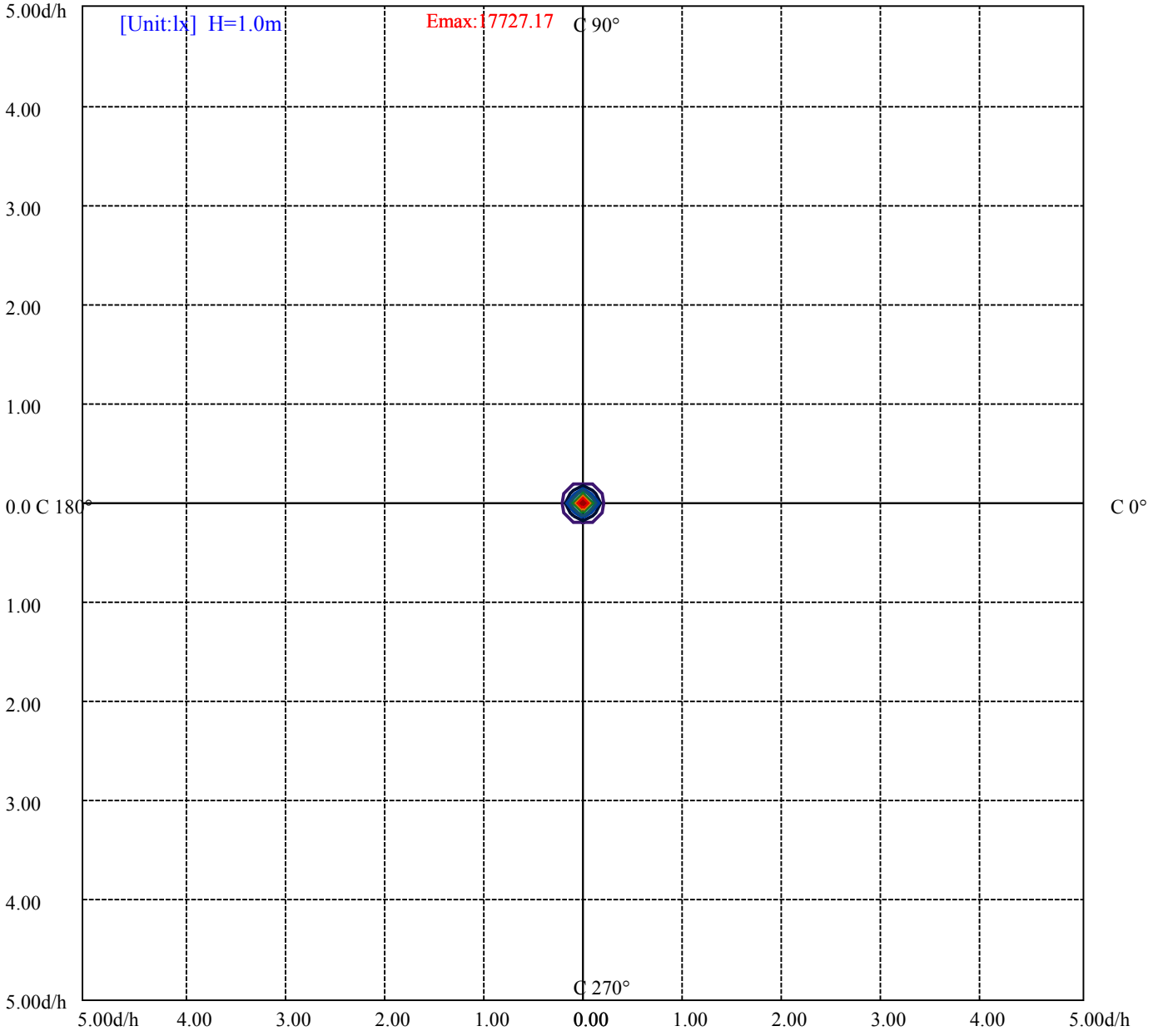
(10%Imax) 1772.72
(20%Imax) 3545.44
(30%Imax) 5318.16
(40%Imax) 7090.88
(50%Imax) 8863.59
(60%Imax) 10636.3
(70%Imax) 12409
(80%Imax) 14181.8
(90%Imax) 15954.5

Equipment: GMS1980
Temperature(°C): 25.0

Date: 2018/11/15
Humidity(%): 65.0%

Operator: NT07
Distance(m): 7.50

ISO illuminance diagram

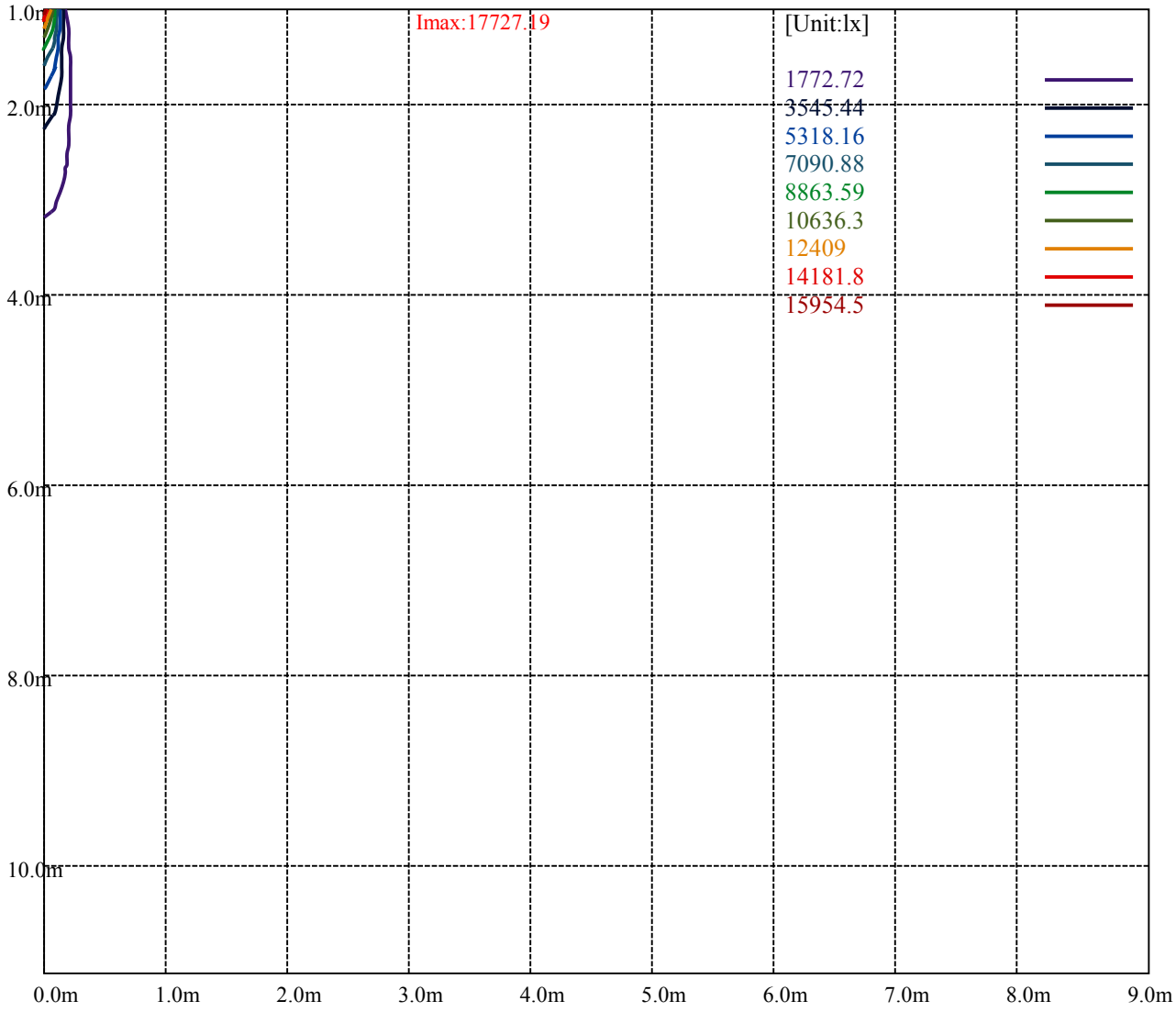


Equipment: GMS1980
Temperature(°C): 25.0

Date: 2018/11/15
Humidity(%): 65.0%

Operator: NT07
Distance(m): 7.50

Space ISO Lux diagram



Equipment: GMS1980
Temperature(°C): 25.0

Date: 2018/11/15
Humidity(%): 65.0%

Operator: NT07
Distance(m): 7.50

Luminance Limitting Curve(no luminous side)

Luminance Table

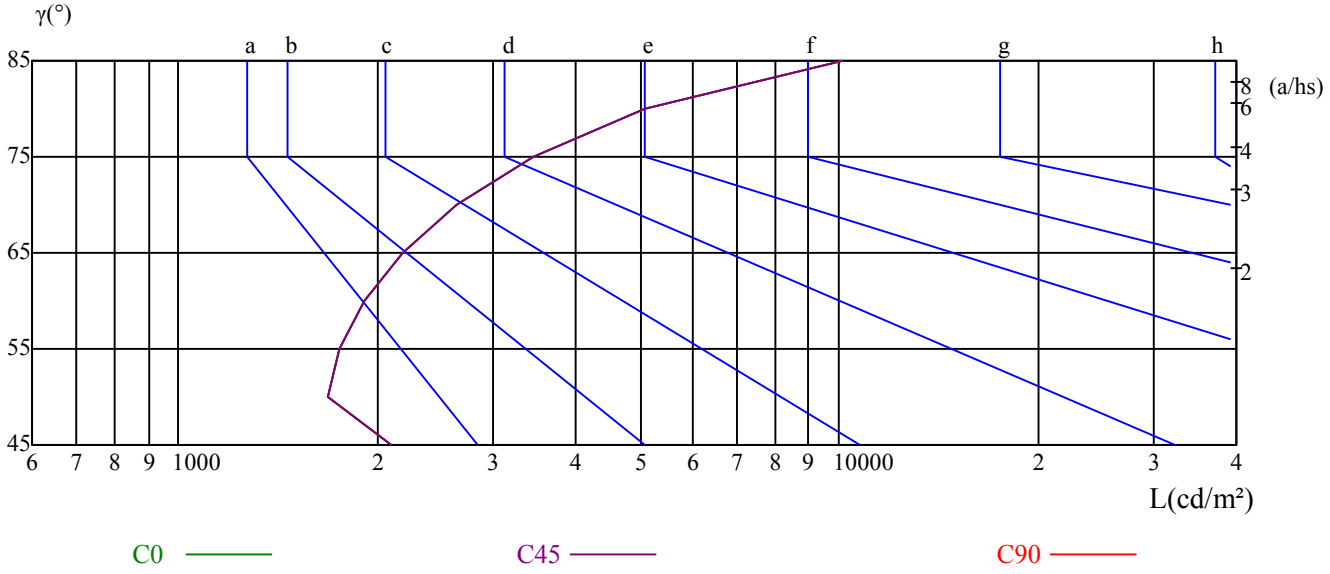
γ	45	50	55	60	65	70	75	80	85
C0	2100	1685	1751	1909	2181	2631	3446	5084	10141
C45	2100	1685	1751	1909	2181	2631	3446	5084	10141
C90	2100	1685	1751	1909	2181	2631	3446	5084	10141

L(Hor)(65)	L(Ver)(65)	L45(65)	L(Hor)(75)	L(Ver)(75)	L45(75)	L(Hor)(85)	L(Ver)(85)	L45(85)
2181	2181	2181	3446	3446	3446	10141	10141	10141

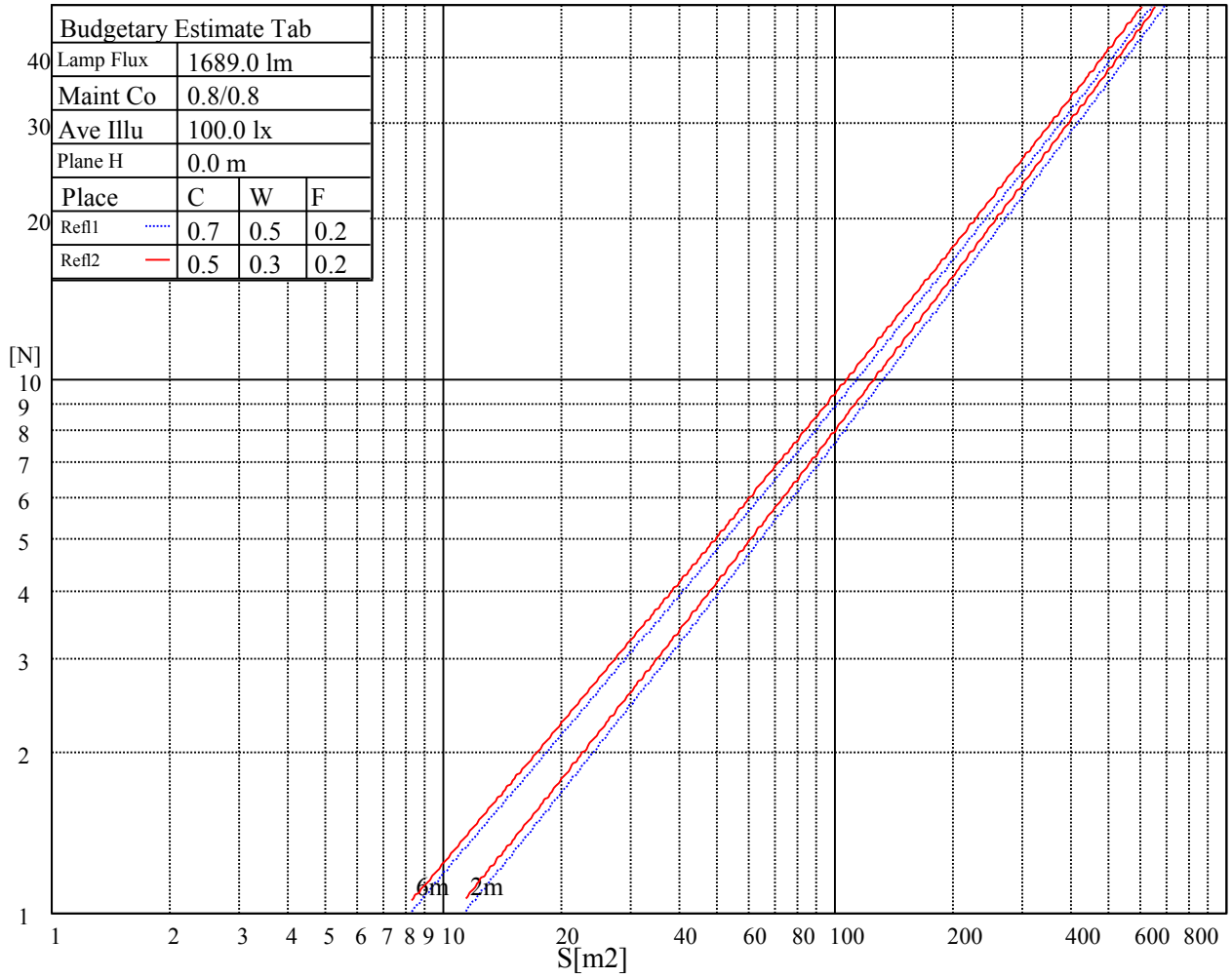
Glare Table

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 Limitting Curve



Budgetary Estimate Table

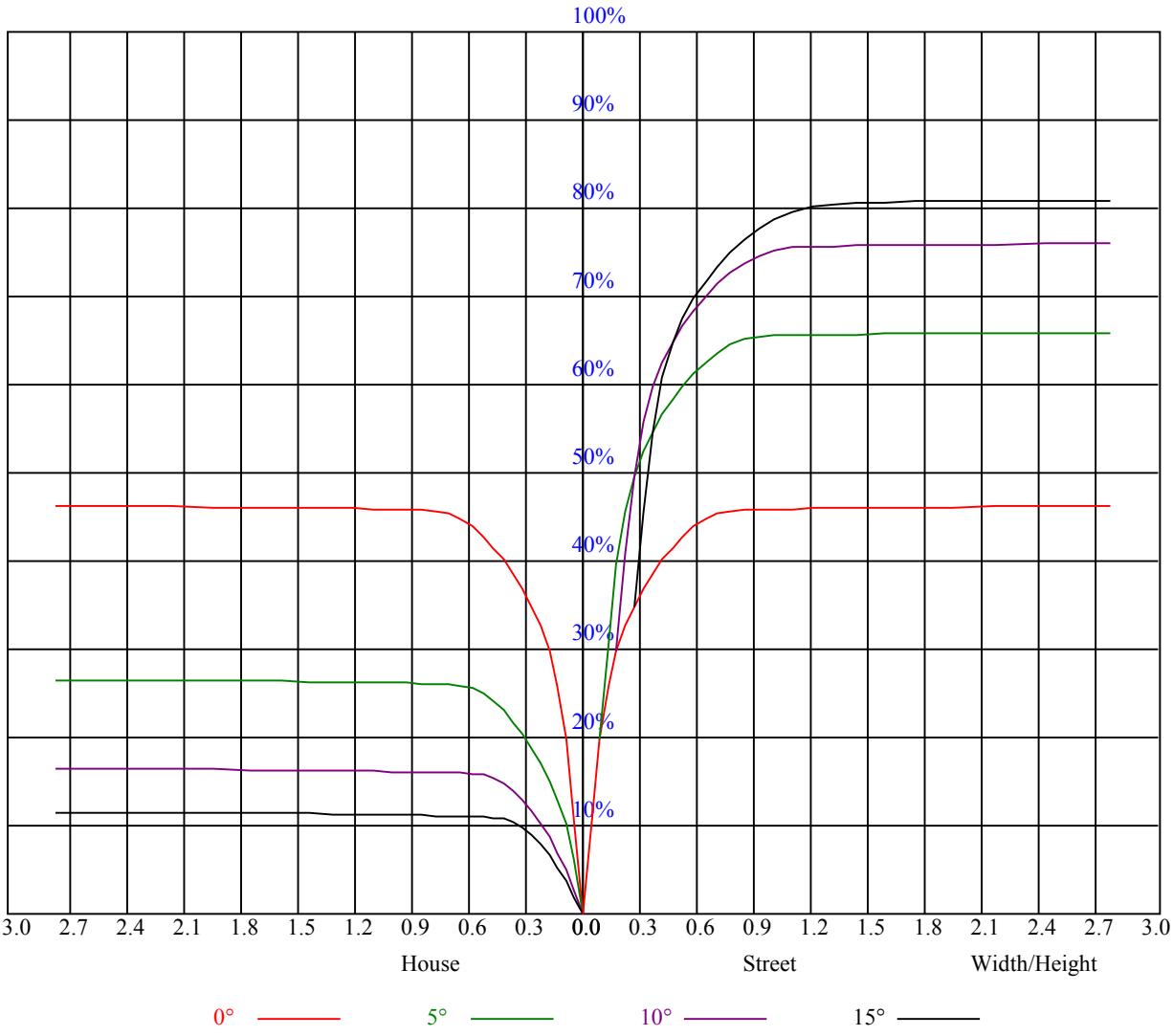


Equipment: GMS1980 Date: 2018/11/15 Operator: NT07
Temperature(°C): 25.0 Humidity(%): 65.0% Distance(m): 7.50

Utilization factor table for indoor luminaire

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	COEFFCIENTS OF UTILIZATION RHOFC=20 CU															
0	1.11	1.11	1.11	1.08	1.08	1.08	1.04	1.04	1.04	0.99	0.99	0.99	0.95	0.95	0.95	0.93
1	1.05	1.03	1.01	1.03	1.01	0.99	0.99	0.98	0.96	0.95	0.94	0.93	0.92	0.91	0.91	0.89
2	1.00	0.97	0.94	0.98	0.95	0.93	0.95	0.93	0.91	0.92	0.91	0.89	0.90	0.88	0.87	0.86
3	0.95	0.92	0.89	0.94	0.91	0.88	0.92	0.89	0.87	0.89	0.87	0.85	0.87	0.86	0.84	0.83
4	0.91	0.87	0.85	0.90	0.87	0.84	0.88	0.85	0.83	0.87	0.84	0.82	0.85	0.83	0.81	0.80
5	0.88	0.84	0.81	0.87	0.83	0.81	0.86	0.82	0.80	0.84	0.81	0.79	0.83	0.81	0.79	0.78
6	0.85	0.81	0.78	0.84	0.81	0.78	0.83	0.80	0.77	0.82	0.79	0.77	0.81	0.78	0.76	0.75
7	0.82	0.78	0.75	0.82	0.78	0.75	0.81	0.77	0.75	0.80	0.77	0.75	0.79	0.76	0.74	0.73
8	0.80	0.76	0.73	0.79	0.76	0.73	0.78	0.75	0.73	0.78	0.75	0.73	0.77	0.74	0.72	0.71
9	0.78	0.74	0.71	0.77	0.74	0.71	0.76	0.73	0.71	0.76	0.73	0.71	0.75	0.72	0.70	0.70
10	0.76	0.72	0.69	0.75	0.72	0.69	0.75	0.71	0.69	0.74	0.71	0.69	0.73	0.71	0.69	0.68

Coefficient Utilization Curve



Equipment: GMS1980
Temperature(°C): 25.0

Date: 2018/11/15
Humidity(%): 65.0%

Operator: NT07
Distance(m): 7.50

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	17904.38	18078.75	17859.38	16880.63	15390.00	13398.75	10575.00	8291.25	6193.13
45.0	17718.75	16846.88	14923.13	12892.50	10687.50	7852.50	5776.88	4168.13	2941.88
90.0	17398.13	16295.63	14383.13	11140.31	9719.44	7201.13	5227.31	3614.63	2576.81
135.0	17887.50	17274.38	15924.38	13905.00	11745.00	9196.88	6721.88	4893.75	3695.63
180.0	17904.38	17032.50	15868.13	13786.88	10985.06	8972.44	6767.44	4722.19	3294.00
225.0	17718.75	18095.63	18033.75	17381.25	16188.75	14146.88	11026.13	9307.69	6859.13
270.0	17398.13	17960.63	18084.38	17701.88	16745.63	14658.75	12481.88	10164.38	7908.75
315.0	17887.50	18039.38	17730.00	16740.00	14996.25	10949.63	10657.69	8100.00	5797.13
360.0	17904.38	18078.75	17859.38	16880.63	15390.00	13398.75	10575.00	8291.25	6193.13

C/γ(°)	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0
0.0	4145.63	3048.75	2936.25	1775.81	1427.63	1222.88	1067.63	960.75	891.00
45.0	2163.94	1705.50	1431.56	1172.25	1020.38	932.06	843.19	792.00	763.31
90.0	1986.75	1560.38	1222.88	1119.71	1001.48	893.98	837.00	795.43	756.96
135.0	2936.25	1915.88	1553.06	1285.88	1112.63	1005.75	917.44	844.88	795.94
180.0	2461.50	1860.19	1485.00	1206.56	1111.84	983.70	909.11	846.23	790.37
225.0	5026.50	3530.81	2540.25	1965.94	1585.69	1285.31	1112.68	1020.15	931.61
270.0	5450.63	3982.50	2947.50	2442.94	1695.94	1411.31	1197.56	1057.50	967.50
315.0	4204.13	2981.81	2196.56	1739.81	1434.94	1120.28	1062.73	972.68	896.68
360.0	4145.63	3048.75	2936.25	1775.81	1427.63	1222.88	1067.63	960.75	891.00

C/γ(°)	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0
0.0	827.44	784.13	749.25	722.25	700.88	680.06	654.75	635.06	617.06
45.0	733.50	713.81	694.69	671.06	650.81	628.88	609.19	592.88	579.94
90.0	733.39	712.69	687.77	666.84	645.75	621.45	605.42	587.36	571.33
135.0	757.69	731.25	705.38	682.31	661.50	641.25	615.94	598.50	583.31
180.0	752.40	726.41	699.92	675.06	653.63	629.33	608.29	587.93	571.95
225.0	862.14	808.99	762.36	729.11	703.52	676.86	653.63	629.55	607.56
270.0	892.13	835.88	783.00	742.50	714.38	689.63	662.63	642.38	622.69
315.0	832.78	787.28	748.01	717.75	695.48	671.96	651.43	629.38	608.96
360.0	827.44	784.13	749.25	722.25	700.88	680.06	654.75	635.06	617.06

C/γ(°)	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0
0.0	597.94	585.56	576.00	563.63	553.50	544.50	533.25	487.13	423.56
45.0	567.56	557.44	546.19	536.06	519.19	471.38	397.13	313.31	293.63
90.0	560.31	549.39	535.84	528.02	505.80	428.29	365.46	292.28	210.43
135.0	569.25	556.88	546.19	534.38	523.69	491.06	427.50	345.94	290.81
180.0	560.59	548.55	536.40	527.74	519.47	481.73	422.33	351.23	267.13
225.0	591.08	576.79	565.48	554.51	545.06	533.87	525.43	501.81	447.64
270.0	600.19	586.69	576.00	565.88	554.63	546.19	536.06	520.31	473.63
315.0	593.72	581.12	567.96	556.26	547.09	536.23	523.13	482.63	400.89
360.0	597.94	585.56	576.00	563.63	553.50	544.50	533.25	487.13	423.56

C/γ(°)	36.0	37.0	38.0	39.0	40.0	41.0	42.0	43.0	44.0
0.0	340.31	291.94	172.29	101.64	40.95	22.28	19.63	16.59	14.12
45.0	151.99	89.72	35.27	20.87	18.56	15.81	12.94	11.36	8.55
90.0	130.28	68.85	26.89	21.38	18.68	15.53	13.44	10.97	8.27
135.0	185.79	116.21	54.84	23.85	20.53	17.38	13.22	11.59	9.56
180.0	183.71	115.43	52.09	23.46	20.19	16.26	12.71	10.86	9.06
225.0	361.80	284.40	206.44	116.27	58.50	25.54	20.70	17.16	13.56
270.0	397.69	322.88	284.06	147.26	80.83	35.16	22.78	20.03	16.54
315.0	324.39	247.89	153.90	87.24	41.01	22.56	20.64	17.49	14.63
360.0	340.31	291.94	172.29	101.64	40.95	22.28	19.63	16.59	14.12

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	12.88	9.17	8.33	8.10	7.93	7.71	7.59	7.48	7.37
45.0	8.16	7.93	7.82	7.71	7.54	7.48	7.31	7.26	7.14
90.0	8.10	7.93	7.76	7.65	7.54	7.43	7.31	7.20	7.09
135.0	8.38	8.27	8.10	7.82	7.65	7.59	7.48	7.37	7.20
180.0	8.21	8.04	7.88	7.71	7.59	7.48	7.37	7.26	7.14
225.0	11.31	9.84	8.38	8.10	7.93	7.76	7.65	7.54	7.37
270.0	13.56	11.70	8.61	8.33	8.16	7.93	7.76	7.65	7.54
315.0	13.22	9.56	8.27	8.10	7.93	7.76	7.59	7.54	7.43
360.0	12.88	9.17	8.33	8.10	7.93	7.71	7.59	7.48	7.37

C/γ(°)	54.0	55.0	56.0	57.0	58.0	59.0	60.0	61.0	62.0
0.0	7.26	7.14	7.09	6.98	6.86	6.86	6.75	6.69	6.69
45.0	7.03	6.98	6.86	6.81	6.75	6.69	6.64	6.58	6.58
90.0	6.98	6.92	6.86	6.81	6.75	6.69	6.64	6.58	6.53
135.0	7.14	7.03	6.98	6.86	6.81	6.75	6.69	6.64	6.58
180.0	7.03	6.98	6.92	6.86	6.75	6.69	6.69	6.64	6.58
225.0	7.31	7.20	7.09	7.03	6.92	6.86	6.81	6.69	6.69
270.0	7.43	7.31	7.20	7.09	7.03	6.98	6.86	6.75	6.75
315.0	7.26	7.14	7.09	7.03	6.98	6.86	6.81	6.75	6.69
360.0	7.26	7.14	7.09	6.98	6.86	6.86	6.75	6.69	6.69

C/γ(°)	63.0	64.0	65.0	66.0	67.0	68.0	69.0	70.0	71.0
0.0	6.64	6.58	6.53	6.53	6.47	6.41	6.41	6.36	6.36
45.0	6.53	6.47	6.47	6.41	6.36	6.36	6.30	6.30	6.30
90.0	6.53	6.47	6.41	6.41	6.36	6.36	6.36	6.30	6.30
135.0	6.58	6.53	6.47	6.47	6.41	6.41	6.36	6.36	6.36
180.0	6.53	6.47	6.47	6.41	6.36	6.36	6.36	6.30	6.30
225.0	6.64	6.58	6.53	6.53	6.47	6.41	6.36	6.36	6.36
270.0	6.69	6.64	6.58	6.58	6.53	6.47	6.47	6.41	6.41
315.0	6.64	6.58	6.58	6.53	6.47	6.41	6.41	6.41	6.36
360.0	6.64	6.58	6.53	6.53	6.47	6.41	6.41	6.36	6.36

C/γ(°)	72.0	73.0	74.0	75.0	76.0	77.0	78.0	79.0	80.0
0.0	6.36	6.36	6.30	6.30	6.30	6.30	6.30	6.24	6.24
45.0	6.30	6.30	6.30	6.24	6.24	6.24	6.24	6.24	6.24
90.0	6.30	6.30	6.24	6.30	6.24	6.24	6.24	6.24	6.19
135.0	6.36	6.30	6.30	6.30	6.30	6.24	6.24	6.24	6.24
180.0	6.30	6.30	6.30	6.24	6.24	6.24	6.24	6.24	6.19
225.0	6.30	6.30	6.30	6.30	6.24	6.24	6.24	6.19	6.24
270.0	6.36	6.36	6.36	6.36	6.30	6.30	6.24	6.24	6.24
315.0	6.36	6.36	6.30	6.30	6.30	6.30	6.30	6.24	6.24
360.0	6.36	6.36	6.30	6.30	6.30	6.30	6.30	6.24	6.24

C/γ(°)	81.0	82.0	83.0	84.0	85.0	86.0	87.0	88.0	89.0
0.0	6.24	6.24	6.24	6.24	6.24	6.30	6.30	6.24	6.19
45.0	6.19	6.24	6.24	6.24	6.30	6.30	6.19	6.13	6.19
90.0	6.19	6.24	6.19	6.24	6.24	6.19	6.13	6.13	6.13
135.0	6.24	6.19	6.19	6.19	6.19	6.19	6.19	6.19	6.13
180.0	6.19	6.19	6.19	6.19	6.19	6.19	6.19	6.13	6.13
225.0	6.19	6.19	6.19	6.19	6.24	6.24	6.24	6.19	6.13
270.0	6.24	6.24	6.24	6.19	6.24	6.24	6.24	6.19	6.19
315.0	6.24	6.24	6.24	6.24	6.24	6.19	6.19	6.19	6.19
360.0	6.24	6.24	6.24	6.24	6.24	6.30	6.30	6.24	6.19

Intensity data(cd)

C/γ(°)	90.0
0.0	6.19
45.0	6.19
90.0	6.13
135.0	6.19
180.0	6.19
225.0	6.13
270.0	6.19
315.0	6.13
360.0	6.19