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NATA

LumCAT: 2-1121-A4
Luminaire: 99.02.73.172+92.76.365.00

Report No: NATA0100	Voltage(V): 36.2000
Test No: GC2018111604	Current(A): 0.5000
LampCAT: OSRAM OPTO SOLERIQ S13 G2	Power (W): 18.1000
Lamp flux(lm): 1702.0	PF: 0.0000
Number of Lamps: 1	Ballast type: DC
Length(mm): 71	Width(mm): 71
Phm Type: C	Height(mm): 0

Photometric Results

Lumens(lm): 1577.02
Efficiency(%): 92.66%
Lumens(lm)/Power(W): 87.20
Central intensity(cd): 5513.344
Maximum intensity(cd): 5513.344
Angle of maximum intensity: C=0.0 γ=0.0
Beam Angle(50%Imax): [C0/180]Total=25.7
[C90/270]Total=25.7
Field angle(10%Imax): [C0/180]Total=60.2
[C90/270]Total=60.2
Maximum s/h(1/2): C0_180=0.44 C90_270=0.44
Maximum s/h(1/4): C0_180=0.41 C90_270=0.41
Up flux rate of lamp(%): 0.00%
Down flux rate of lamp(%): 92.73%
Up flux rate of LUM(%): - -
Down flux rate of LUM(%): 100.00%
CIE Type : Direct lighting
Output flux ratio in π solid angle : 98.631%

Zonal flux distribution table

γ(°)	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
0.0	5513.344	1.319	1.319	.077%	.084%
1.0	5499.563	10.525	11.844	.618%	.751%
2.0	5453.367	20.871	32.715	1.226%	2.074%
3.0	5388.258	30.924	63.639	1.817%	4.035%
4.0	5303.531	40.570	104.209	2.384%	6.608%
5.0	5174.297	49.454	153.663	2.906%	9.744%
6.0	5021.930	57.565	211.227	3.382%	13.394%
7.0	4828.711	64.532	275.76	3.792%	17.486%
8.0	4572.211	69.780	345.54	4.100%	21.911%
9.0	4264.664	73.159	418.699	4.298%	26.550%
10.0	3906.773	74.394	493.094	4.371%	31.268%
11.0	3509.578	73.435	566.529	4.315%	35.924%
12.0	3112.242	70.958	637.488	4.169%	40.424%
13.0	2688.961	66.332	703.82	3.897%	44.630%
14.0	2264.344	60.072	763.891	3.529%	48.439%
15.0	1902.537	53.998	817.89	3.173%	51.863%
16.0	1591.256	48.098	865.988	2.826%	54.913%
17.0	1330.699	42.665	908.653	2.507%	57.618%
18.0	1118.609	37.906	946.559	2.227%	60.022%
19.0	976.936	34.879	981.438	2.049%	62.234%
20.0	865.477	32.461	1013.898	1.907%	64.292%
21.0	786.045	30.891	1044.789	1.815%	66.251%
22.0	731.609	30.054	1074.843	1.766%	68.157%
23.0	687.530	29.459	1104.303	1.731%	70.025%
24.0	653.041	29.128	1133.43	1.711%	71.872%
25.0	627.729	29.092	1162.522	1.709%	73.717%
26.0	606.902	29.175	1191.697	1.714%	75.567%
27.0	589.247	29.336	1221.033	1.724%	77.427%
28.0	575.726	29.640	1250.673	1.741%	79.306%
29.0	562.985	29.931	1280.604	1.759%	81.204%
30.0	552.312	30.283	1310.887	1.779%	83.125%
31.0	542.517	30.641	1341.528	1.800%	85.068%
32.0	522.759	30.378	1371.907	1.785%	86.994%
33.0	493.284	29.462	1401.368	1.731%	88.862%
34.0	461.159	28.279	1429.647	1.662%	90.655%
35.0	411.630	25.891	1455.538	1.521%	92.297%
36.0	355.521	22.916	1478.454	1.346%	93.750%
37.0	298.554	19.703	1498.158	1.158%	95.000%

Zonal flux distribution table

γ(°)	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
38.0	227.686	15.372	1513.53	.903%	95.974%
39.0	167.597	11.566	1525.096	.680%	96.708%
40.0	110.862	7.814	1532.91	.459%	97.203%
41.0	71.670	5.156	1538.066	.303%	97.530%
42.0	42.785	3.139	1541.206	.184%	97.729%
43.0	24.314	1.818	1543.024	.107%	97.845%
44.0	17.719	1.350	1544.374	.079%	97.930%
45.0	15.546	1.205	1545.58	.071%	98.007%
46.0	13.388	1.056	1546.636	.062%	98.074%
47.0	11.152	0.894	1547.53	.053%	98.130%
48.0	9.991	0.814	1548.344	.048%	98.182%
49.0	9.288	0.769	1549.113	.045%	98.231%
50.0	8.487	0.713	1549.826	.042%	98.276%
51.0	8.142	0.694	1550.52	.041%	98.320%
52.0	7.988	0.690	1551.21	.041%	98.364%
53.0	7.854	0.688	1551.898	.040%	98.407%
54.0	7.699	0.683	1552.581	.040%	98.451%
55.0	7.601	0.683	1553.264	.040%	98.494%
56.0	7.509	0.683	1553.946	.040%	98.537%
57.0	7.411	0.682	1554.628	.040%	98.580%
58.0	7.341	0.683	1555.311	.040%	98.624%
59.0	7.235	0.680	1555.991	.040%	98.667%
60.0	7.165	0.680	1556.671	.040%	98.710%
61.0	7.109	0.682	1557.353	.040%	98.753%
62.0	7.052	0.683	1558.036	.040%	98.796%
63.0	6.989	0.683	1558.719	.040%	98.840%
64.0	6.940	0.684	1559.403	.040%	98.883%
65.0	6.891	0.685	1560.087	.040%	98.927%
66.0	6.848	0.686	1560.774	.040%	98.970%
67.0	6.799	0.686	1561.46	.040%	99.014%
68.0	6.743	0.686	1562.145	.040%	99.057%
69.0	6.715	0.687	1562.833	.040%	99.101%
70.0	6.680	0.688	1563.521	.040%	99.144%
71.0	6.623	0.687	1564.208	.040%	99.188%
72.0	6.602	0.689	1564.897	.040%	99.232%
73.0	6.574	0.689	1565.586	.041%	99.275%
74.0	6.553	0.691	1566.277	.041%	99.319%
75.0	6.511	0.690	1566.966	.041%	99.363%

Zonal flux distribution table

γ(°)	Average I(cd)	Zonal F(lm)	Sum F(lm)	Eff Flux(%)	Eff Sum(%)
76.0	6.504	0.692	1567.658	.041%	99.407%
77.0	6.483	0.693	1568.351	.041%	99.451%
78.0	6.455	0.692	1569.044	.041%	99.494%
79.0	6.441	0.693	1569.737	.041%	99.538%
80.0	6.434	0.695	1570.432	.041%	99.582%
81.0	6.391	0.692	1571.124	.041%	99.626%
82.0	6.384	0.693	1571.817	.041%	99.670%
83.0	6.384	0.695	1572.512	.041%	99.714%
84.0	6.391	0.697	1573.209	.041%	99.759%
85.0	6.363	0.695	1573.904	.041%	99.803%
86.0	6.335	0.693	1574.597	.041%	99.847%
87.0	6.328	0.693	1575.29	.041%	99.891%
88.0	6.300	0.690	1575.981	.041%	99.934%
89.0	6.293	0.690	1576.671	.041%	99.978%
90.0	6.293	0.345	1577.016	.020%	100.000%

Zonal flux distribution table

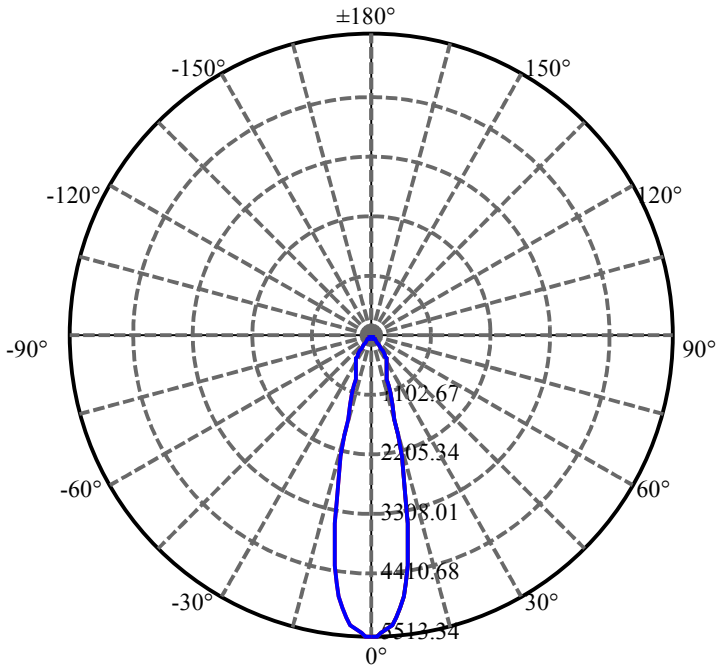
ZONAL LUMEN SUMMARY

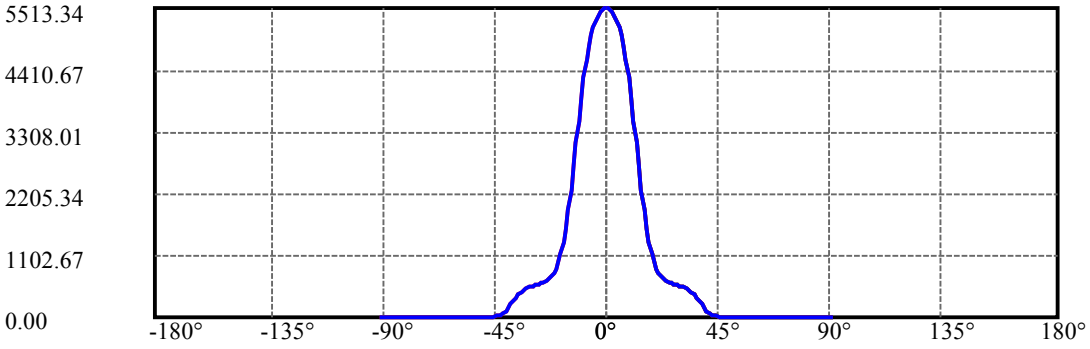
Zone	Lumens	%Lamp	%Fixt
0-30	1310.89	77.02%	83.12%
0-40	1532.91	90.07%	97.20%
0-60	1556.67	91.46%	98.71%
0-90	1576.67	92.64%	99.98%
0-120	1576.67	92.64%	99.98%
0-180	1577.02	92.66%	100.00%
60-90	20.68	1.22%	1.31%
90-120	0.00	0.00%	0.00%
90-130	0.00	0.00%	0.00%
90-150	0.00	0.00%	0.00%
90-180	0.00	0.00%	0.00%
0-28.37	1261.61	74.13%	80.00%

ZONAL LUMEN SUMMARY

0-10	493.09
10-20	520.80
20-30	296.99
30-40	222.02
40-50	16.92
50-60	6.85
60-70	6.85
70-80	6.91
80-90	6.24
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):

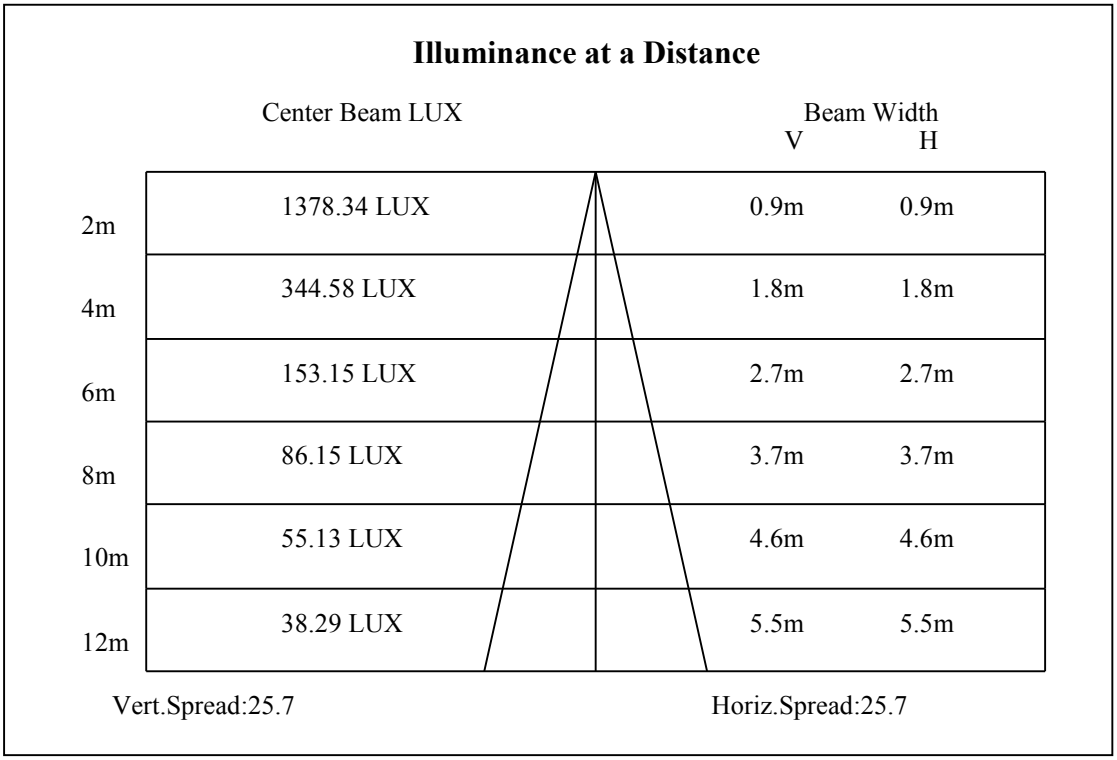
C0/C180:

C90/C270:

Field angle(10%Imax):C0/180Left:30.1 Right:30.1
:C90/270Left:30.1 Right:30.1

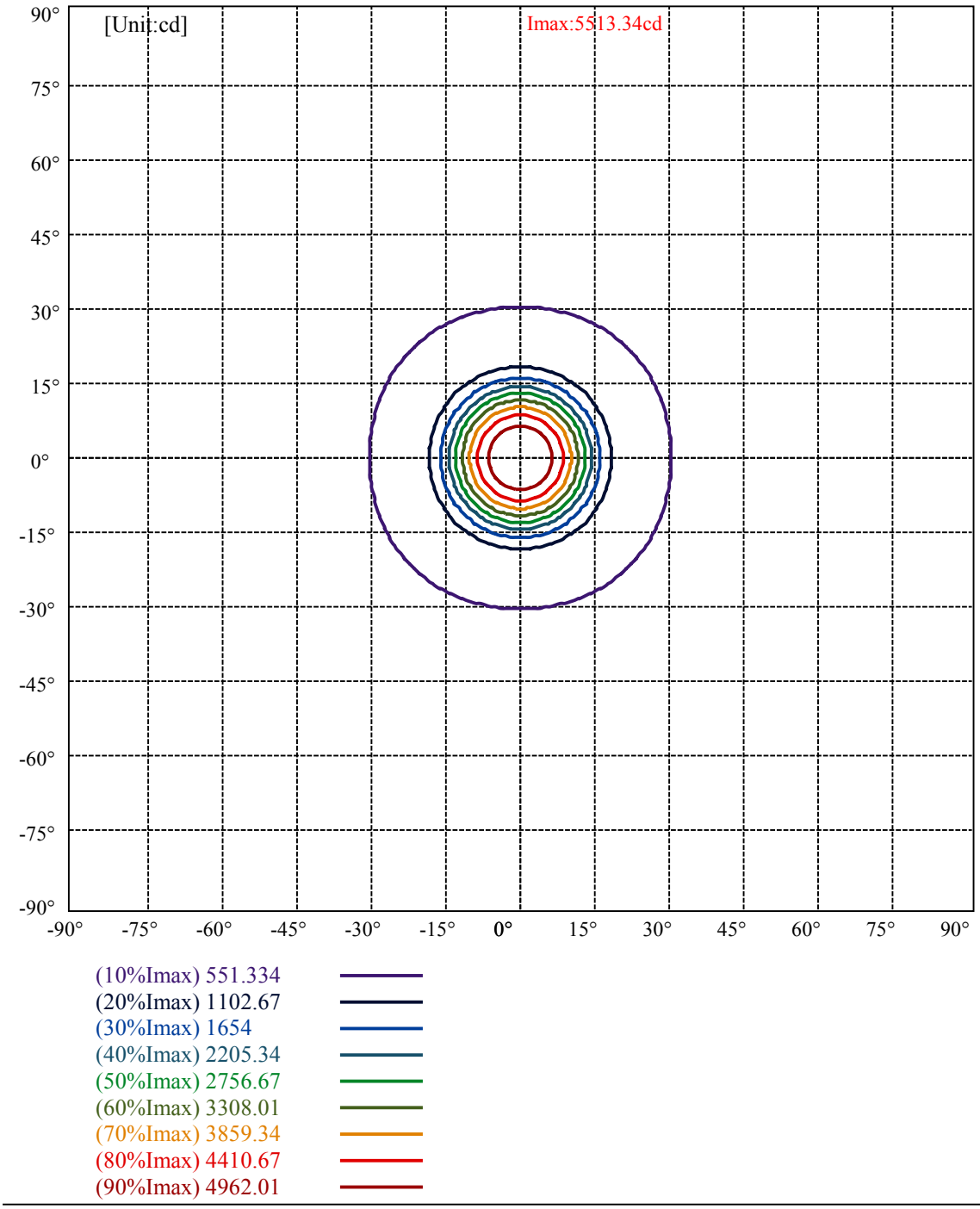
Beam Angle(50%Imax):C0/180Left:12.8 Right:12.8
:C90/270Left:12.8 Right:12.8

Lux distance Curve



Equipment: GMS1980 Date: 2018/11/16 Operator: NT07
Temperature(°C): 25.0 Humidity(%): 65.0% Distance(m): 7.50

ISO-Intensity(V-H)

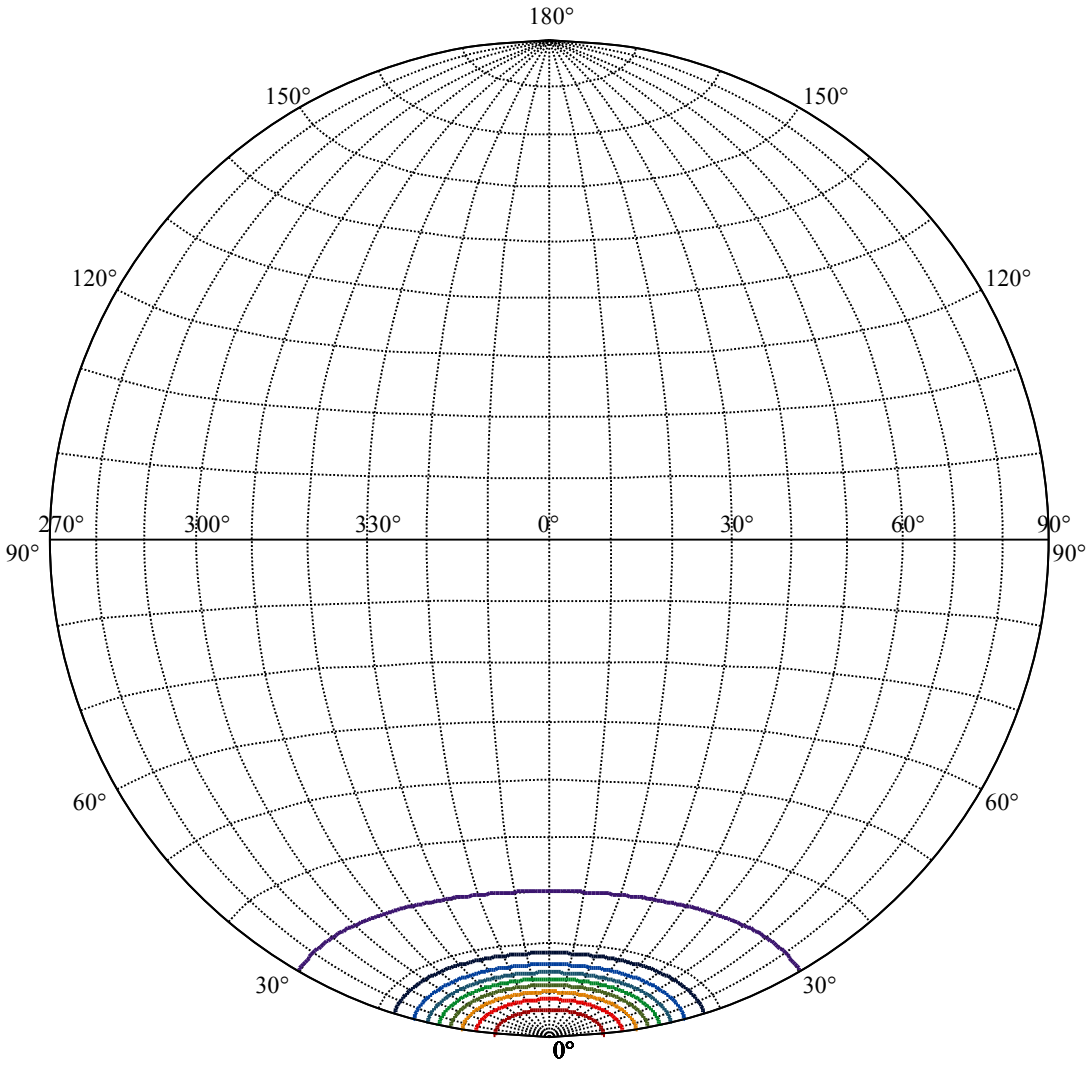


Equipment: GMS1980
Temperature(°C): 25.0

Date: 2018/11/16
Humidity(%): 65.0%

Operator: NT07
Distance(m): 7.50

ISO candela diagram on circular web



House [Unit:cd] Road

Imax:5513.34

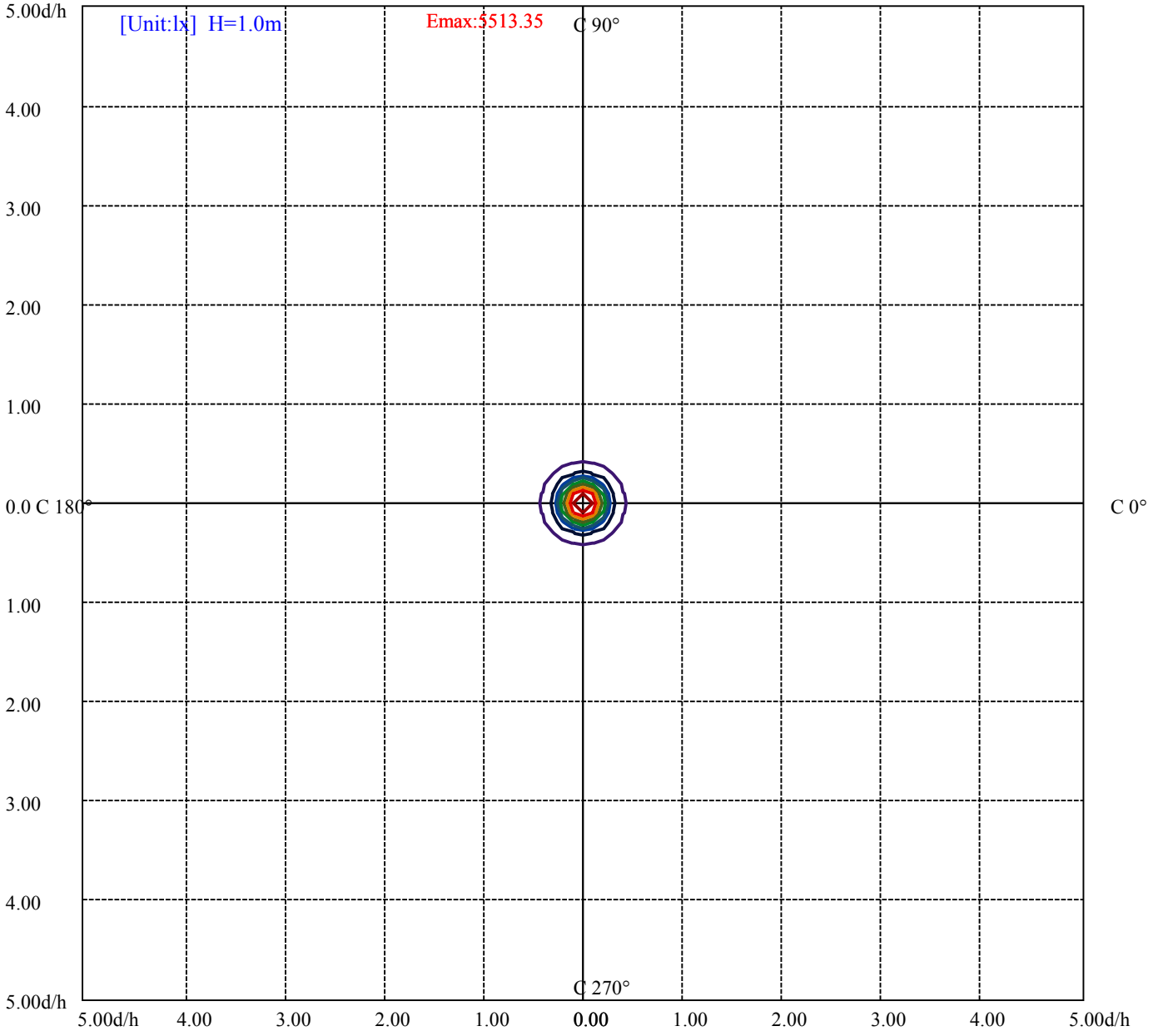
(10%Imax) 551.334
(20%Imax) 1102.67
(30%Imax) 1654
(40%Imax) 2205.34
(50%Imax) 2756.67
(60%Imax) 3308.01
(70%Imax) 3859.34
(80%Imax) 4410.67
(90%Imax) 4962.01

Equipment: GMS1980
Temperature(°C): 25.0

Date: 2018/11/16
Humidity(%): 65.0%

Operator: NT07
Distance(m): 7.50

ISO illuminance diagram

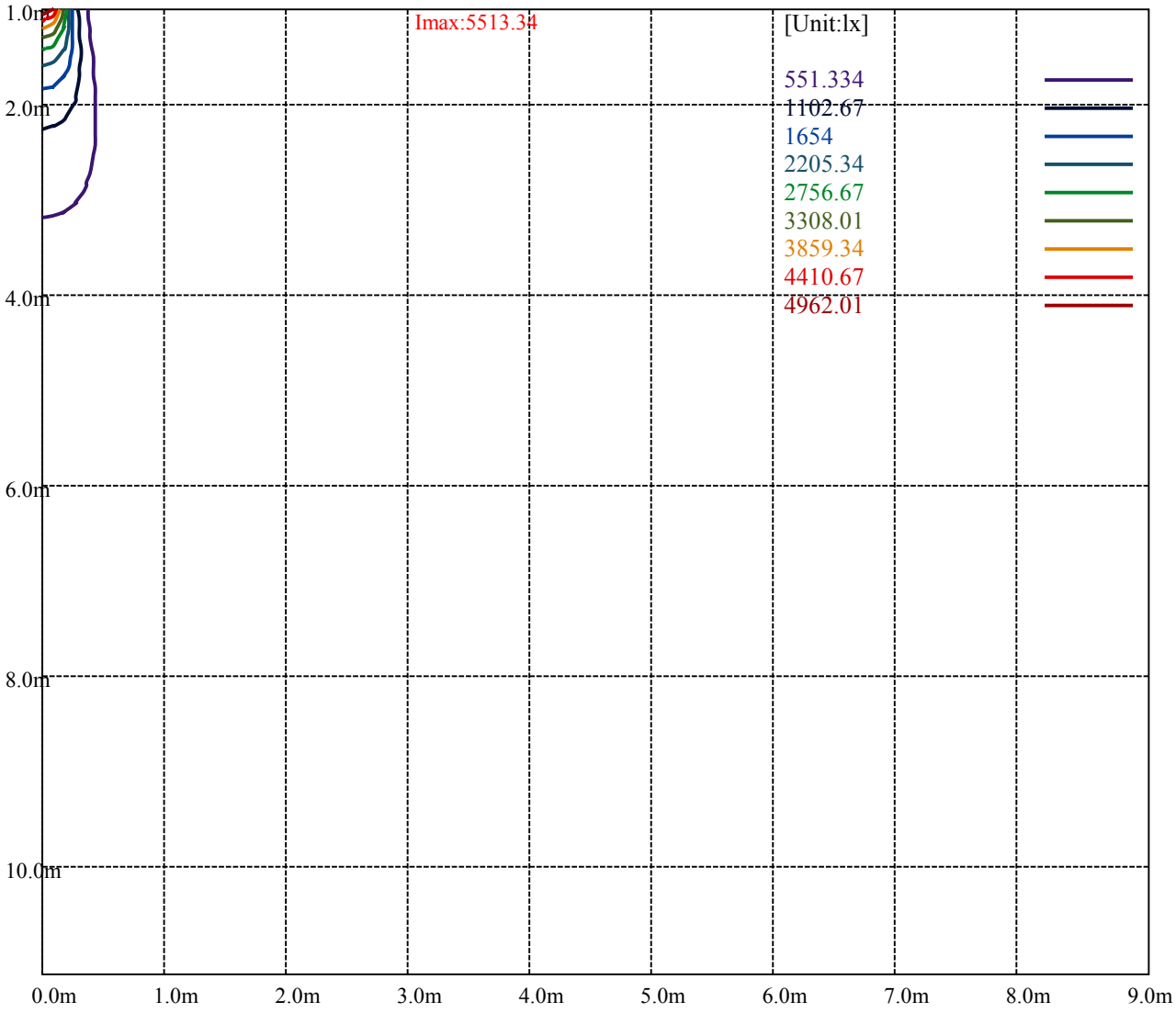


Equipment: GMS1980
Temperature(°C): 25.0

Date: 2018/11/16
Humidity(%): 65.0%

Operator: NT07
Distance(m): 7.50

Space ISO Lux diagram



Equipment: GMS1980
Temperature(°C): 25.0

Date: 2018/11/16
Humidity(%): 65.0%

Operator: NT07
Distance(m): 7.50

NATA 2-1121-A3

Luminance Limitting Curve(no luminous side)

Luminance Table

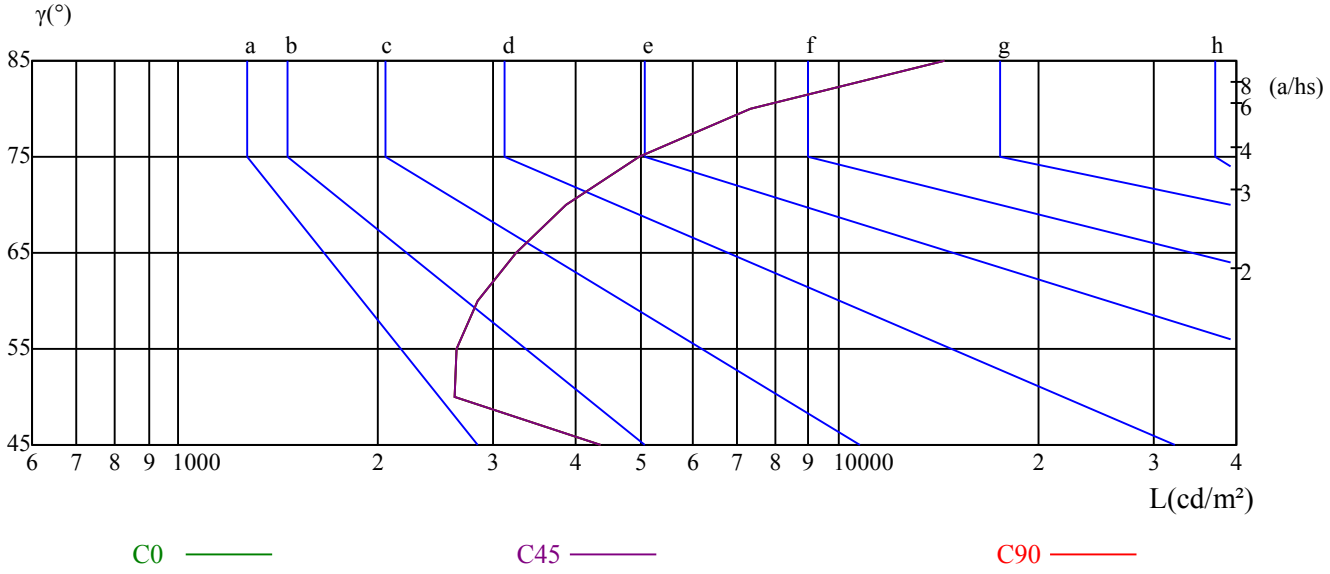
γ	45	50	55	60	65	70	75	80	85
C0	4361	2619	2629	2843	3234	3874	4990	7350	14483
C45	4361	2619	2629	2843	3234	3874	4990	7350	14483
C90	4361	2619	2629	2843	3234	3874	4990	7350	14483

L(Hor)(65)	L(Ver)(65)	L45(65)	L(Hor)(75)	L(Ver)(75)	L45(75)	L(Hor)(85)	L(Ver)(85)	L45(85)
3234	3234	3234	4990	4990	4990	14483	14483	14483

Glare Table

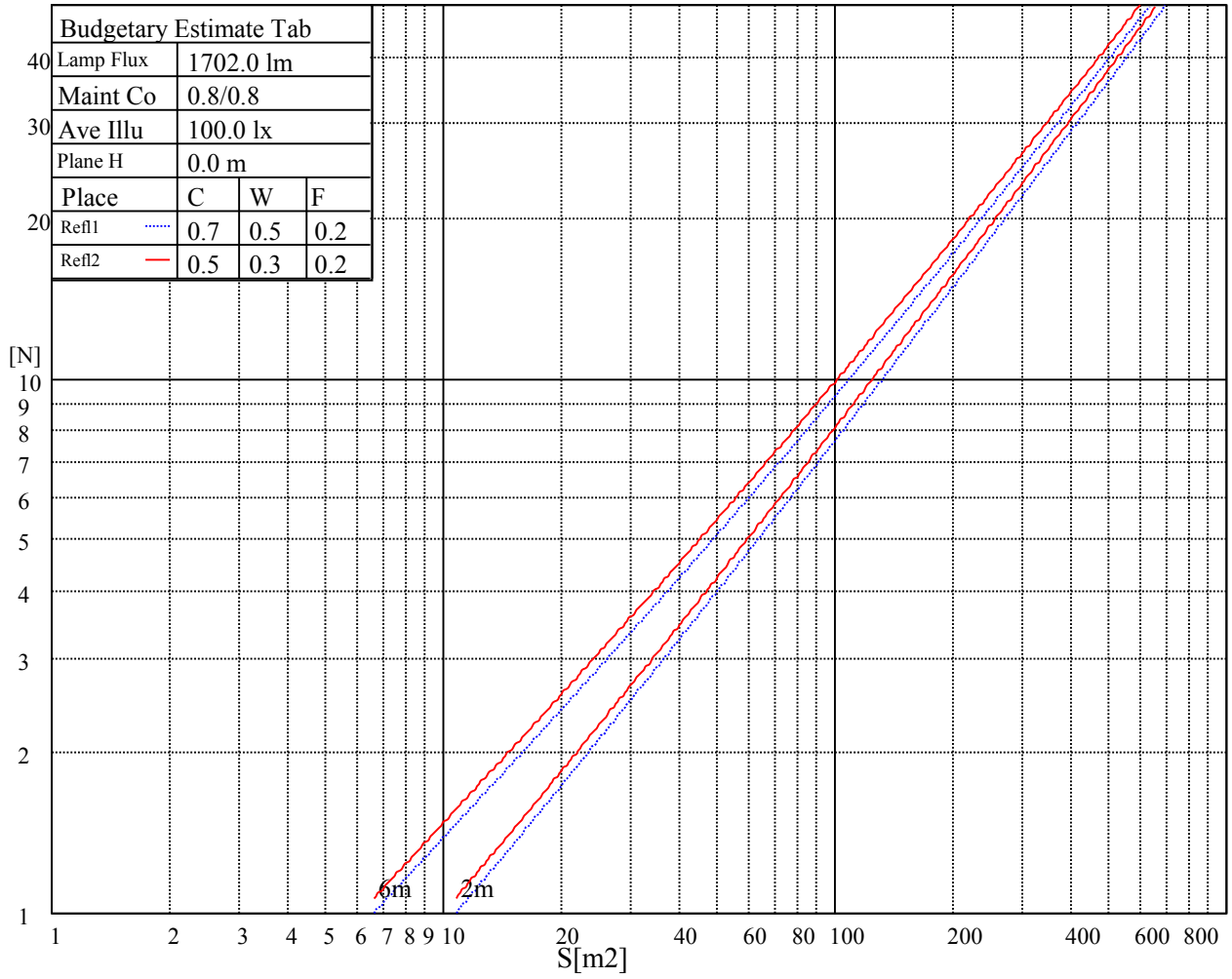
Glare	Quality	Service Values Illuminance(lx)							
1.15	A	2000	1000	500	<=300				
1.5	B		2000	1000	500	<=300			
1.85	C			2000	1000	500	<=300		
2.2	D				2000	1000	500	<=300	
2.55	E					2000	1000	500	<=300
		a	b	c	d	e	f	g	h

Luminance Limitting Curve



Equipment: GMS1980 Date: 2018/11/16 Operator: NT07
Temperature(°C): 25.0 Humidity(%): 65.0% Distance(m): 7.50

Budgetary Estimate Table

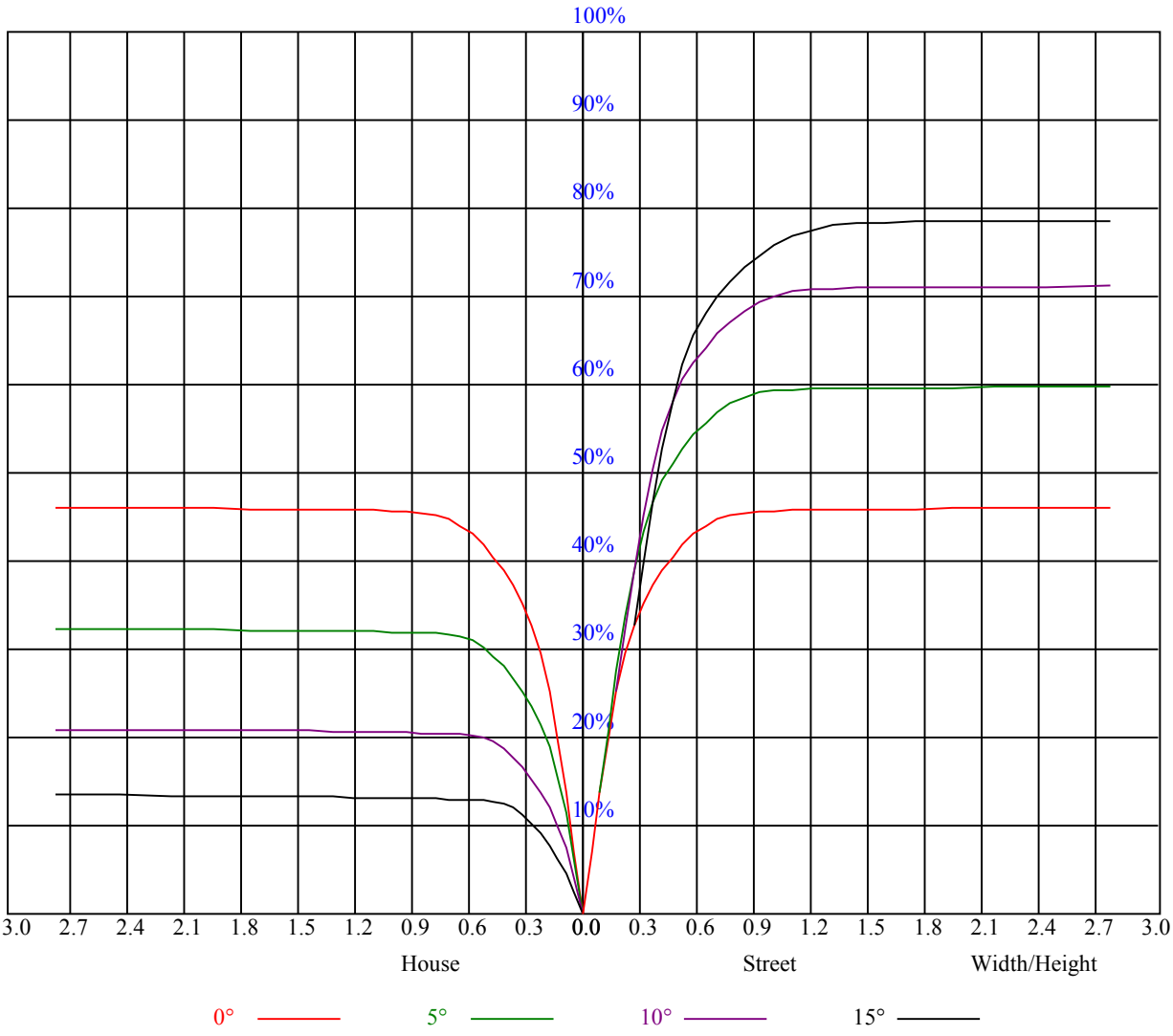


Equipment: GMS1980 Date: 2018/11/16 Operator: NT07
Temperature(°C): 25.0 Humidity(%): 65.0% Distance(m): 7.50

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	1.10	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	0.96	0.94	0.91	0.93	0.91	0.89	0.91	0.89	0.87	0.88	0.87	0.85	0.84
3	0.93	0.89	0.86	0.92	0.88	0.85	0.89	0.86	0.84	0.87	0.85	0.83	0.85	0.83	0.82	0.80
4	0.89	0.84	0.81	0.88	0.84	0.81	0.86	0.82	0.80	0.84	0.81	0.79	0.82	0.80	0.78	0.77
5	0.85	0.80	0.77	0.84	0.80	0.77	0.82	0.79	0.76	0.81	0.78	0.75	0.79	0.77	0.75	0.74
6	0.81	0.77	0.73	0.80	0.76	0.73	0.79	0.75	0.73	0.78	0.75	0.72	0.77	0.74	0.72	0.71
7	0.78	0.73	0.70	0.77	0.73	0.70	0.76	0.72	0.70	0.75	0.72	0.69	0.74	0.71	0.69	0.68
8	0.75	0.70	0.67	0.74	0.70	0.67	0.74	0.70	0.67	0.73	0.69	0.67	0.72	0.69	0.67	0.66
9	0.72	0.68	0.65	0.72	0.68	0.65	0.71	0.67	0.65	0.70	0.67	0.64	0.70	0.67	0.64	0.63
10	0.70	0.65	0.63	0.69	0.65	0.63	0.69	0.65	0.62	0.68	0.65	0.62	0.67	0.64	0.62	0.61

Coefficient Utilization Curve



Equipment: GMS1980
Temperature(°C): 25.0

Date: 2018/11/16
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	5486.63	5544.56	5564.25	5536.69	5455.13	5353.88	5259.38	5129.44	4962.94
45.0	5551.88	5502.38	5412.94	5311.69	5216.63	5070.94	4888.13	4629.38	4314.94
90.0	5495.06	5420.25	5313.38	5227.88	5124.94	4926.38	4713.19	4464.00	4080.38
135.0	5519.81	5451.75	5353.31	5277.94	5191.88	5027.63	4835.81	4605.19	4302.00
180.0	5486.63	5418.00	5346.56	5243.06	5125.50	4955.06	4699.69	4387.50	4050.00
225.0	5551.88	5556.38	5512.50	5450.06	5373.56	5275.69	5176.13	5028.75	4795.88
270.0	5495.06	5542.31	5554.13	5525.44	5467.50	5387.63	5304.94	5212.13	5055.19
315.0	5519.81	5560.88	5569.88	5533.31	5473.13	5397.19	5298.19	5173.31	5016.38
360.0	5486.63	5544.56	5564.25	5536.69	5455.13	5353.88	5259.38	5129.44	4962.94

C/γ(°)	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0
0.0	4718.81	4425.19	4114.69	3757.50	3263.63	2857.50	2452.50	1981.13	1658.25
45.0	3975.19	3538.69	3080.25	2673.56	2274.19	1821.38	1526.63	1291.50	1083.38
90.0	3764.25	3327.75	2836.13	2487.94	2063.81	1657.69	1426.50	1111.67	1012.22
135.0	3928.50	3544.31	3090.94	2682.00	2232.00	1834.31	1542.38	1279.13	1071.00
180.0	3612.94	3148.88	2732.63	2269.69	1892.25	1535.06	1108.86	1068.13	937.69
225.0	4503.94	4192.31	3782.81	3334.50	2923.88	2460.38	2073.38	1689.19	1373.63
270.0	4833.00	4589.44	4258.69	3916.13	3483.56	3030.19	2620.69	2219.63	1766.25
315.0	4780.69	4487.63	4180.50	3776.63	3378.38	2918.25	2469.38	2089.69	1743.19
360.0	4718.81	4425.19	4114.69	3757.50	3263.63	2857.50	2452.50	1981.13	1658.25

C/γ(°)	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0
0.0	1397.25	1189.13	993.94	884.81	797.63	743.06	697.50	663.19	639.56
45.0	932.63	841.50	770.63	718.31	681.19	647.44	623.25	600.75	583.31
90.0	878.74	798.53	739.46	686.53	654.75	628.71	601.48	584.66	571.11
135.0	936.00	849.94	755.44	707.63	676.13	637.31	615.38	599.06	581.06
180.0	829.01	770.01	725.79	683.94	656.61	632.48	607.22	590.91	578.03
225.0	1115.49	1006.31	876.60	804.21	750.88	705.04	672.24	646.20	620.83
270.0	1469.25	1238.06	1031.63	913.50	826.31	756.00	707.06	675.00	645.19
315.0	1390.50	1122.02	1030.33	889.43	809.38	750.21	700.20	662.06	636.13
360.0	1397.25	1189.13	993.94	884.81	797.63	743.06	697.50	663.19	639.56

C/γ(°)	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0
0.0	616.50	600.19	586.13	573.75	562.50	553.50	544.50	533.81	515.25
45.0	571.50	560.81	549.00	540.56	531.56	516.94	480.94	432.00	369.56
90.0	557.83	547.65	539.38	530.55	519.02	480.49	424.74	368.10	299.25
135.0	567.56	558.00	547.31	538.88	529.88	495.00	446.06	387.56	310.50
180.0	561.99	553.39	543.26	533.03	525.54	496.35	437.79	388.13	326.08
225.0	602.21	585.68	571.05	560.36	551.36	540.96	533.36	521.61	474.36
270.0	623.25	603.56	587.25	573.75	562.50	551.81	542.25	533.81	504.56
315.0	613.13	596.53	580.50	567.62	557.78	547.03	536.63	524.25	493.48
360.0	616.50	600.19	586.13	573.75	562.50	553.50	544.50	533.81	515.25

C/γ(°)	36.0	37.0	38.0	39.0	40.0	41.0	42.0	43.0	44.0
0.0	475.31	421.88	345.94	289.13	212.51	143.83	84.32	43.59	24.64
45.0	301.50	285.19	175.16	115.43	60.02	29.14	22.11	19.58	16.71
90.0	229.16	169.54	115.20	57.49	28.35	21.94	19.46	16.26	13.44
135.0	287.44	185.68	115.26	66.26	30.94	18.96	16.82	14.57	11.87
180.0	237.71	184.44	127.69	70.48	29.36	18.11	15.69	13.05	10.69
225.0	422.38	364.61	294.19	221.29	159.98	99.39	52.93	22.61	18.51
270.0	460.69	406.69	338.63	289.13	196.43	130.44	73.69	37.24	23.01
315.0	429.98	370.41	309.43	231.58	169.31	111.54	57.26	27.62	22.89
360.0	475.31	421.88	345.94	289.13	212.51	143.83	84.32	43.59	24.64

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	22.05	19.52	15.98	13.61	11.98	9.96	8.61	8.38	8.16
45.0	13.78	12.15	10.58	8.66	8.44	8.16	8.04	7.93	7.82
90.0	11.76	10.13	8.66	8.44	8.27	8.10	7.93	7.82	7.76
135.0	10.52	9.62	8.66	8.44	8.21	8.10	7.93	7.82	7.71
180.0	9.45	9.00	8.33	8.10	7.99	7.82	7.71	7.59	7.54
225.0	15.98	12.60	10.13	9.39	8.72	8.21	7.99	7.82	7.65
270.0	20.59	17.04	13.28	11.42	10.41	8.83	8.55	8.33	8.10
315.0	20.25	17.04	13.61	11.87	10.29	8.72	8.38	8.21	8.10
360.0	22.05	19.52	15.98	13.61	11.98	9.96	8.61	8.38	8.16

C/γ(°)	54.0	55.0	56.0	57.0	58.0	59.0	60.0	61.0	62.0
0.0	7.99	7.88	7.76	7.65	7.59	7.43	7.37	7.26	7.26
45.0	7.65	7.59	7.54	7.43	7.37	7.26	7.20	7.14	7.14
90.0	7.65	7.48	7.43	7.31	7.26	7.14	7.14	7.03	7.03
135.0	7.59	7.48	7.37	7.31	7.20	7.14	7.09	7.09	6.98
180.0	7.37	7.31	7.26	7.20	7.14	7.03	6.98	6.98	6.86
225.0	7.54	7.48	7.37	7.31	7.26	7.14	7.03	6.98	6.92
270.0	7.88	7.76	7.65	7.54	7.43	7.37	7.26	7.20	7.09
315.0	7.93	7.82	7.71	7.54	7.48	7.37	7.26	7.20	7.14
360.0	7.99	7.88	7.76	7.65	7.59	7.43	7.37	7.26	7.26

C/γ(°)	63.0	64.0	65.0	66.0	67.0	68.0	69.0	70.0	71.0
0.0	7.14	7.09	7.03	6.98	6.92	6.86	6.86	6.81	6.75
45.0	7.03	6.98	6.92	6.86	6.81	6.75	6.69	6.69	6.64
90.0	6.98	6.92	6.86	6.81	6.75	6.69	6.69	6.64	6.58
135.0	6.92	6.86	6.86	6.81	6.75	6.69	6.69	6.64	6.58
180.0	6.86	6.81	6.75	6.75	6.69	6.64	6.64	6.58	6.53
225.0	6.92	6.86	6.81	6.75	6.75	6.69	6.64	6.64	6.58
270.0	7.03	6.98	6.92	6.92	6.86	6.81	6.75	6.69	6.64
315.0	7.03	7.03	6.98	6.92	6.86	6.81	6.75	6.75	6.69
360.0	7.14	7.09	7.03	6.98	6.92	6.86	6.86	6.81	6.75

C/γ(°)	72.0	73.0	74.0	75.0	76.0	77.0	78.0	79.0	80.0
0.0	6.69	6.69	6.64	6.58	6.58	6.53	6.53	6.53	6.47
45.0	6.64	6.58	6.53	6.47	6.47	6.47	6.47	6.41	6.41
90.0	6.58	6.53	6.53	6.47	6.47	6.47	6.41	6.41	6.41
135.0	6.58	6.58	6.53	6.53	6.53	6.47	6.47	6.41	6.41
180.0	6.53	6.47	6.53	6.47	6.47	6.41	6.41	6.41	6.41
225.0	6.53	6.53	6.53	6.47	6.47	6.47	6.41	6.41	6.41
270.0	6.64	6.58	6.58	6.53	6.53	6.53	6.47	6.47	6.47
315.0	6.64	6.64	6.58	6.58	6.53	6.53	6.47	6.47	6.47
360.0	6.69	6.69	6.64	6.58	6.58	6.53	6.53	6.53	6.47

C/γ(°)	81.0	82.0	83.0	84.0	85.0	86.0	87.0	88.0	89.0
0.0	6.47	6.41	6.41	6.36	6.36	6.36	6.41	6.30	6.30
45.0	6.36	6.36	6.36	6.36	6.36	6.30	6.24	6.30	6.24
90.0	6.36	6.36	6.36	6.36	6.36	6.30	6.30	6.24	6.30
135.0	6.41	6.41	6.41	6.47	6.36	6.36	6.30	6.30	6.30
180.0	6.36	6.36	6.36	6.41	6.36	6.30	6.30	6.30	6.30
225.0	6.36	6.36	6.36	6.36	6.36	6.36	6.36	6.24	6.30
270.0	6.41	6.41	6.41	6.41	6.41	6.36	6.36	6.36	6.30
315.0	6.41	6.41	6.41	6.41	6.36	6.36	6.36	6.36	6.30
360.0	6.47	6.41	6.41	6.36	6.36	6.36	6.41	6.30	6.30

Intensity data(cd)

C/γ(°)	90.0
0.0	6.30
45.0	6.30
90.0	6.30
135.0	6.30
180.0	6.30
225.0	6.24
270.0	6.30
315.0	6.30
360.0	6.30