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## Nata

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### Client:

LumCAT: 1654-N

Luminaire: 92.70.043.00

Report No: nata0100

Test No: GC2018050201

LampCAT: CREE CXA1310

Lamp flux(lm): 622.9

Number of Lamps: 1

Length(mm): 32

Phm Type: C

Voltage(V): 17.8000

Current(A): 0.3500

Power (W): 6.2300

PF: 0.0000

Ballast type: DC

Width(mm): 32

Height(mm): 0

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## Photometric Results

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Lumens(lm): 544.44, Efficiency(%): 87.40% , Luminous Efficacy(lm/W): 87.39

Central intensity(cd): 3103.529, Maximum intensity(cd): 3103.529

Angle of maximum intensity: C=0.0  $\gamma$ =0.0

Beam Angle(50%Imax): [C0/180]Total=18.8

[C90/270]Total=18.8

Field angle(10%Imax): [C0/180]Total=37.2

[C90/270]Total=37.2

Maximum s/h(1/2): C0\_180=0.32 C90\_270=0.32

Maximum s/h(1/4): C0\_180=0.33 C90\_270=0.33

Up flux rate of lamp(%): 0.00%

Down flux rate of lamp(%): 87.86%

Up flux rate of LUM(%): - -

Down flux rate of LUM(%): 100.00%

CIE Type : Direct lighting

Output flux ratio in  $\pi$  solid angle : 97.925%

| $\gamma(^{\circ})$ | Average I(cd) | Zonal F(lm) | Sum F(lm) | Eff Flux(%) | Eff Sum(%) |
|--------------------|---------------|-------------|-----------|-------------|------------|
| 0.0                | 3103.529      | 2.970       | 2.97      | .477%       | .546%      |
| 2.0                | 3022.665      | 23.135      | 26.105    | 3.714%      | 4.795%     |
| 4.0                | 2782.619      | 42.570      | 68.675    | 6.834%      | 12.614%    |
| 6.0                | 2374.170      | 54.427      | 123.102   | 8.737%      | 22.611%    |
| 8.0                | 1899.446      | 57.976      | 181.078   | 9.307%      | 33.259%    |
| 10.0               | 1415.493      | 53.907      | 234.984   | 8.654%      | 43.161%    |
| 12.0               | 1006.555      | 45.897      | 280.881   | 7.368%      | 51.591%    |
| 14.0               | 672.528       | 35.682      | 316.563   | 5.728%      | 58.145%    |
| 16.0               | 458.503       | 27.717      | 344.28    | 4.450%      | 63.236%    |
| 18.0               | 327.730       | 22.211      | 366.491   | 3.566%      | 67.315%    |
| 20.0               | 268.985       | 20.176      | 386.667   | 3.239%      | 71.021%    |
| 22.0               | 235.462       | 19.345      | 406.012   | 3.105%      | 74.574%    |
| 24.0               | 215.938       | 19.262      | 425.274   | 3.092%      | 78.112%    |
| 26.0               | 204.390       | 19.650      | 444.925   | 3.155%      | 81.721%    |
| 28.0               | 195.024       | 20.080      | 465.005   | 3.224%      | 85.410%    |
| 30.0               | 180.351       | 19.777      | 484.781   | 3.175%      | 89.042%    |
| 32.0               | 146.760       | 17.056      | 501.837   | 2.738%      | 92.175%    |
| 34.0               | 104.187       | 12.777      | 514.615   | 2.051%      | 94.522%    |
| 36.0               | 59.784        | 7.707       | 522.322   | 1.237%      | 95.937%    |
| 38.0               | 25.828        | 3.487       | 525.809   | .560%       | 96.578%    |
| 40.0               | 11.163        | 1.574       | 527.383   | .253%       | 96.867%    |
| 42.0               | 8.431         | 1.237       | 528.62    | .199%       | 97.094%    |
| 44.0               | 6.627         | 1.010       | 529.629   | .162%       | 97.279%    |
| 46.0               | 5.808         | 0.916       | 530.546   | .147%       | 97.448%    |
| 48.0               | 5.244         | 0.855       | 531.4     | .137%       | 97.605%    |
| 50.0               | 4.852         | 0.815       | 532.216   | .131%       | 97.754%    |
| 52.0               | 4.535         | 0.784       | 532.999   | .126%       | 97.898%    |
| 54.0               | 4.349         | 0.772       | 533.771   | .124%       | 98.040%    |
| 56.0               | 4.115         | 0.748       | 534.519   | .120%       | 98.178%    |
| 58.0               | 3.943         | 0.733       | 535.253   | .118%       | 98.312%    |
| 60.0               | 3.771         | 0.716       | 535.969   | .115%       | 98.444%    |
| 62.0               | 3.592         | 0.696       | 536.665   | .112%       | 98.572%    |
| 64.0               | 3.400         | 0.670       | 537.335   | .108%       | 98.695%    |
| 66.0               | 3.262         | 0.654       | 537.988   | .105%       | 98.815%    |
| 68.0               | 3.111         | 0.633       | 538.621   | .102%       | 98.931%    |
| 70.0               | 2.973         | 0.613       | 539.234   | .098%       | 99.044%    |
| 72.0               | 2.842         | 0.593       | 539.827   | .095%       | 99.152%    |
| 74.0               | 2.760         | 0.582       | 540.408   | .093%       | 99.259%    |

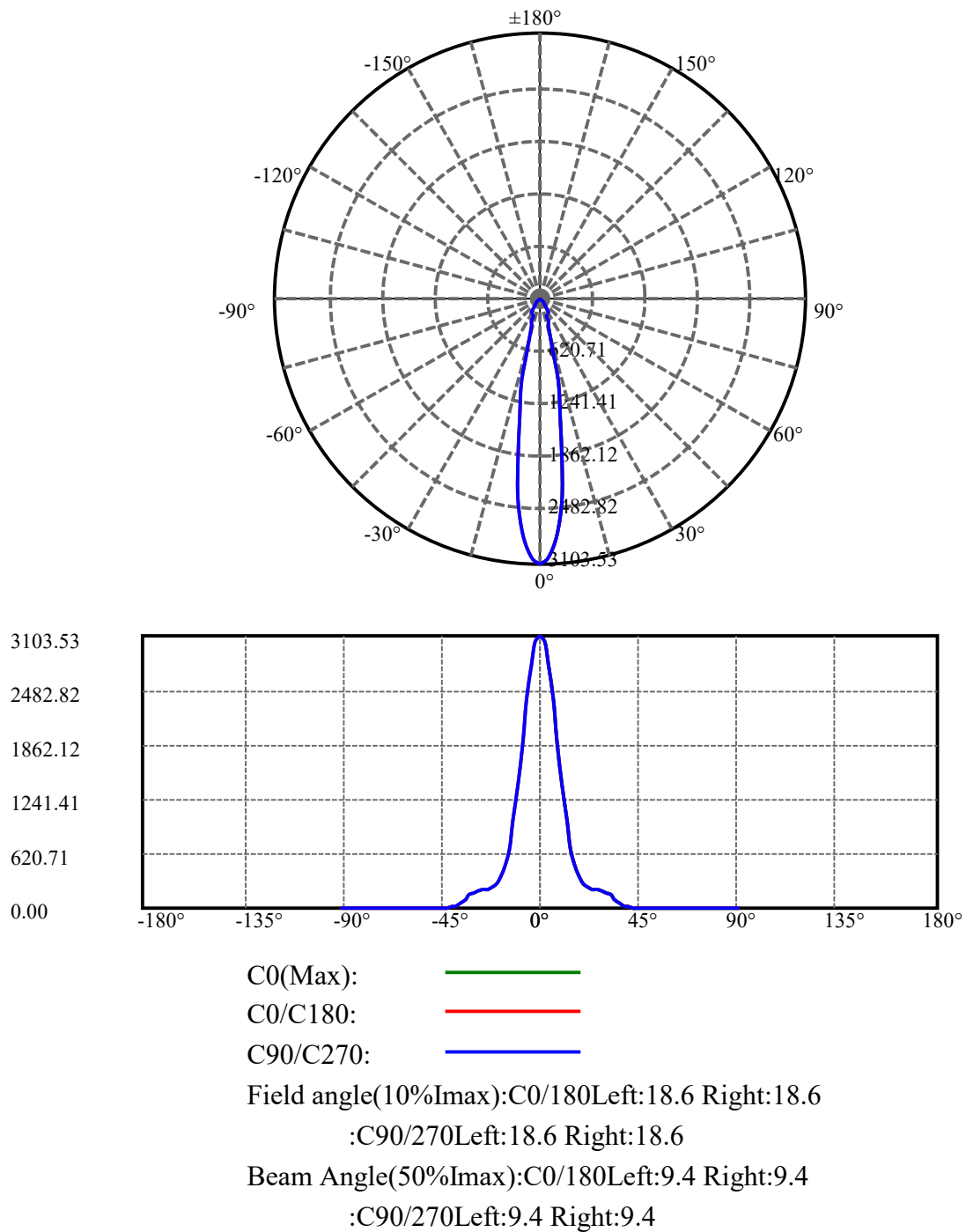
| $\gamma(^{\circ})$ | Average I(cd) | Zonal F(lm) | Sum F(lm) | Eff Flux(%) | Eff Sum(%) |
|--------------------|---------------|-------------|-----------|-------------|------------|
| 76.0               | 2.684         | 0.571       | 540.98    | .092%       | 99.364%    |
| 78.0               | 2.622         | 0.562       | 541.542   | .090%       | 99.468%    |
| 80.0               | 2.560         | 0.553       | 542.095   | .089%       | 99.569%    |
| 82.0               | 2.498         | 0.543       | 542.637   | .087%       | 99.669%    |
| 84.0               | 2.436         | 0.531       | 543.169   | .085%       | 99.766%    |
| 86.0               | 2.422         | 0.530       | 543.699   | .085%       | 99.864%    |
| 88.0               | 2.278         | 0.499       | 544.198   | .080%       | 99.955%    |
| 90.0               | 2.216         | 0.243       | 544.441   | .039%       | 100.000%   |

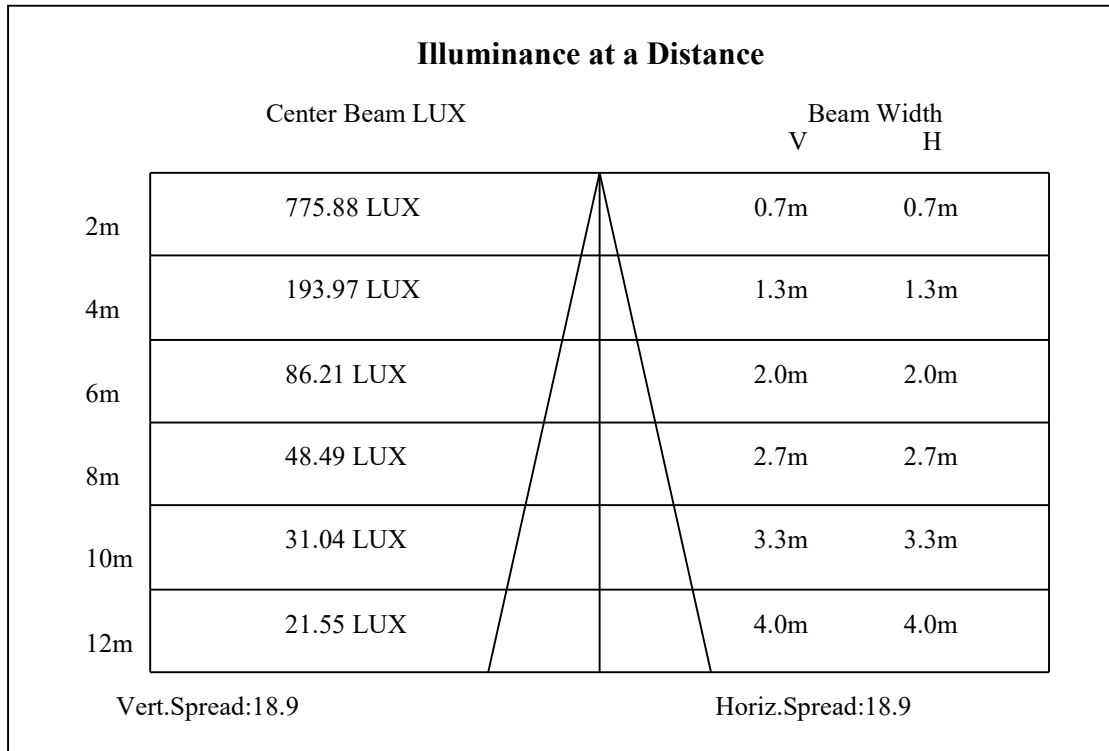
## ZONAL LUMEN SUMMARY

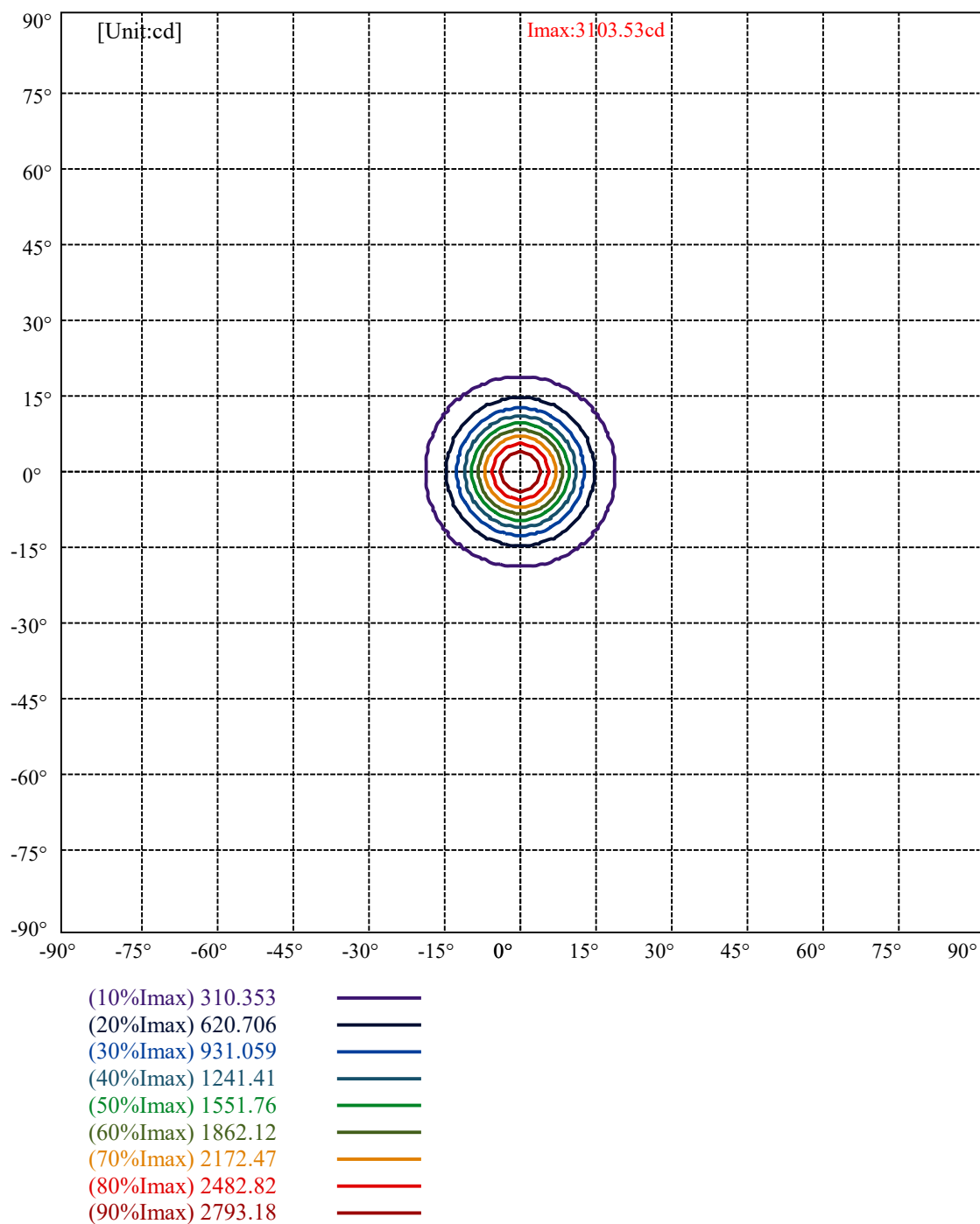
| Zone    | Lumens | %Lamp  | %Fixt   |
|---------|--------|--------|---------|
| 0-30    | 484.78 | 77.82% | 89.04%  |
| 0-40    | 527.38 | 84.66% | 96.87%  |
| 0-60    | 535.97 | 86.04% | 98.44%  |
| 0-90    | 544.20 | 87.36% | 99.96%  |
| 0-120   | 544.20 | 87.36% | 99.96%  |
| 0-180   | 544.44 | 87.40% | 100.00% |
| 60-90   | 8.95   | 1.44%  | 1.64%   |
| 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%   |
| 0-25.05 | 435.55 | 69.92% | 80.00%  |

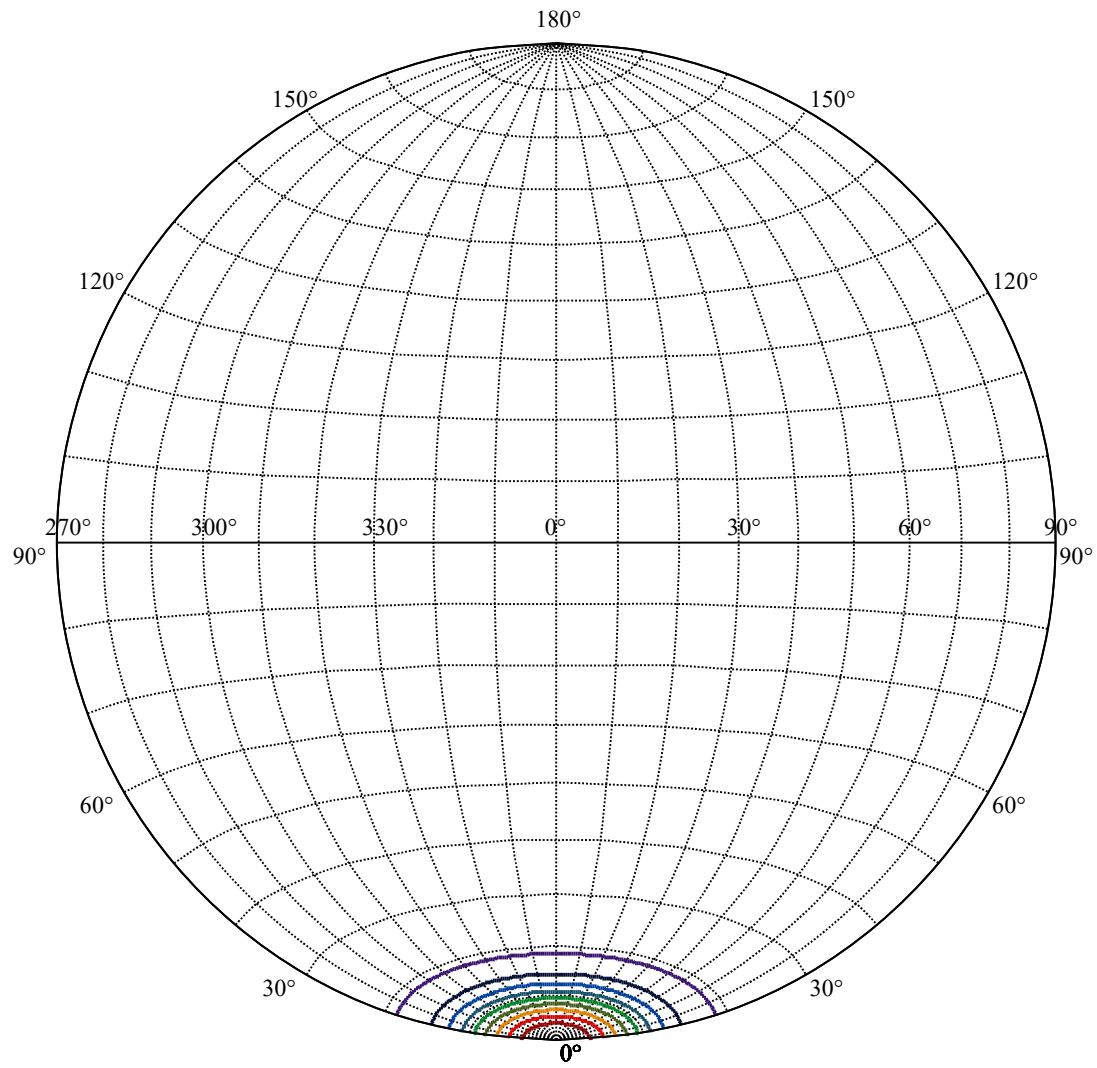
## ZONAL LUMEN SUMMARY

|         |        |
|---------|--------|
| 0-10    | 234.98 |
| 10-20   | 151.68 |
| 20-30   | 98.11  |
| 30-40   | 42.60  |
| 40-50   | 4.83   |
| 50-60   | 3.75   |
| 60-70   | 3.26   |
| 70-80   | 2.86   |
| 80-90   | 2.10   |
| 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   |



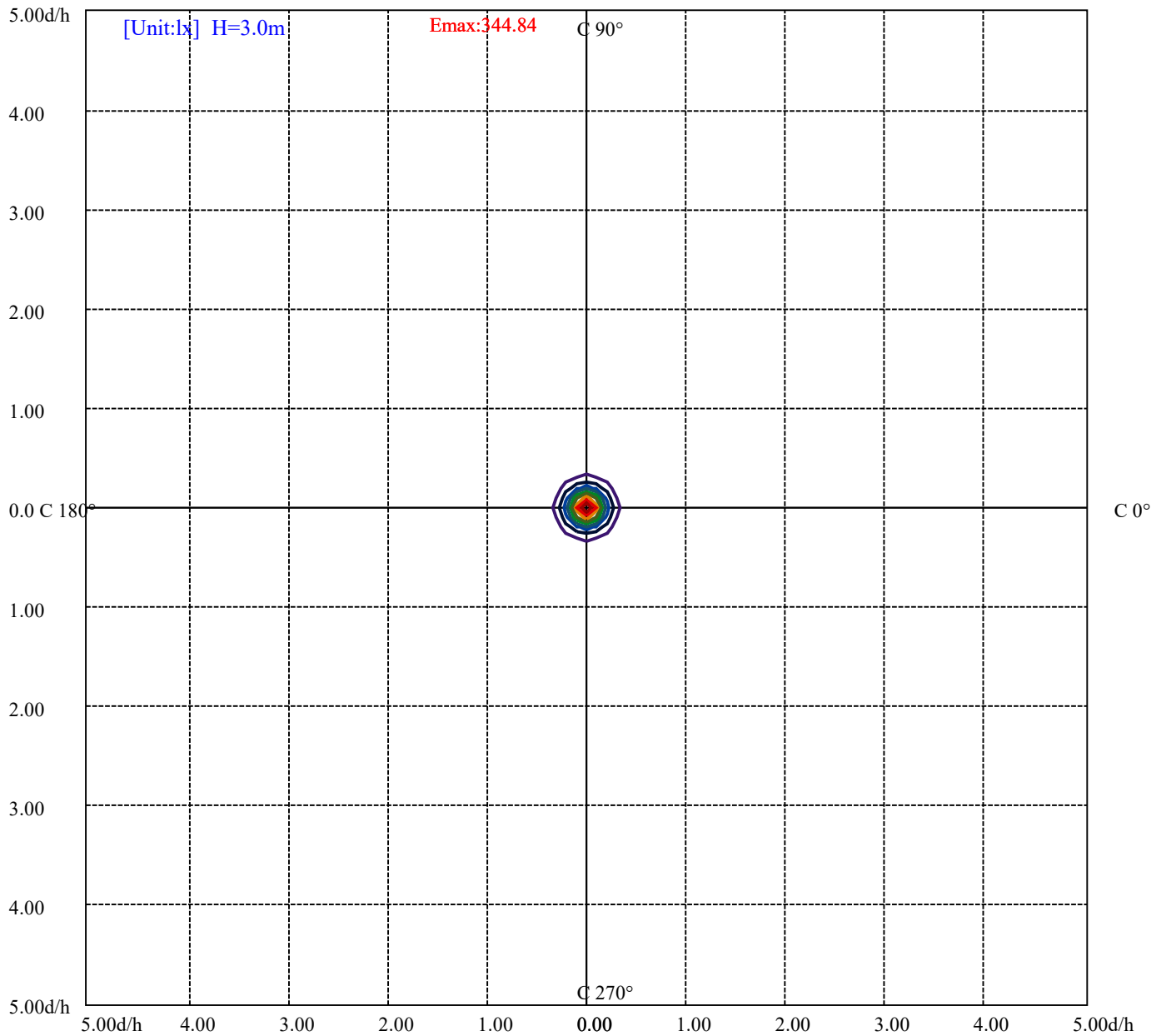




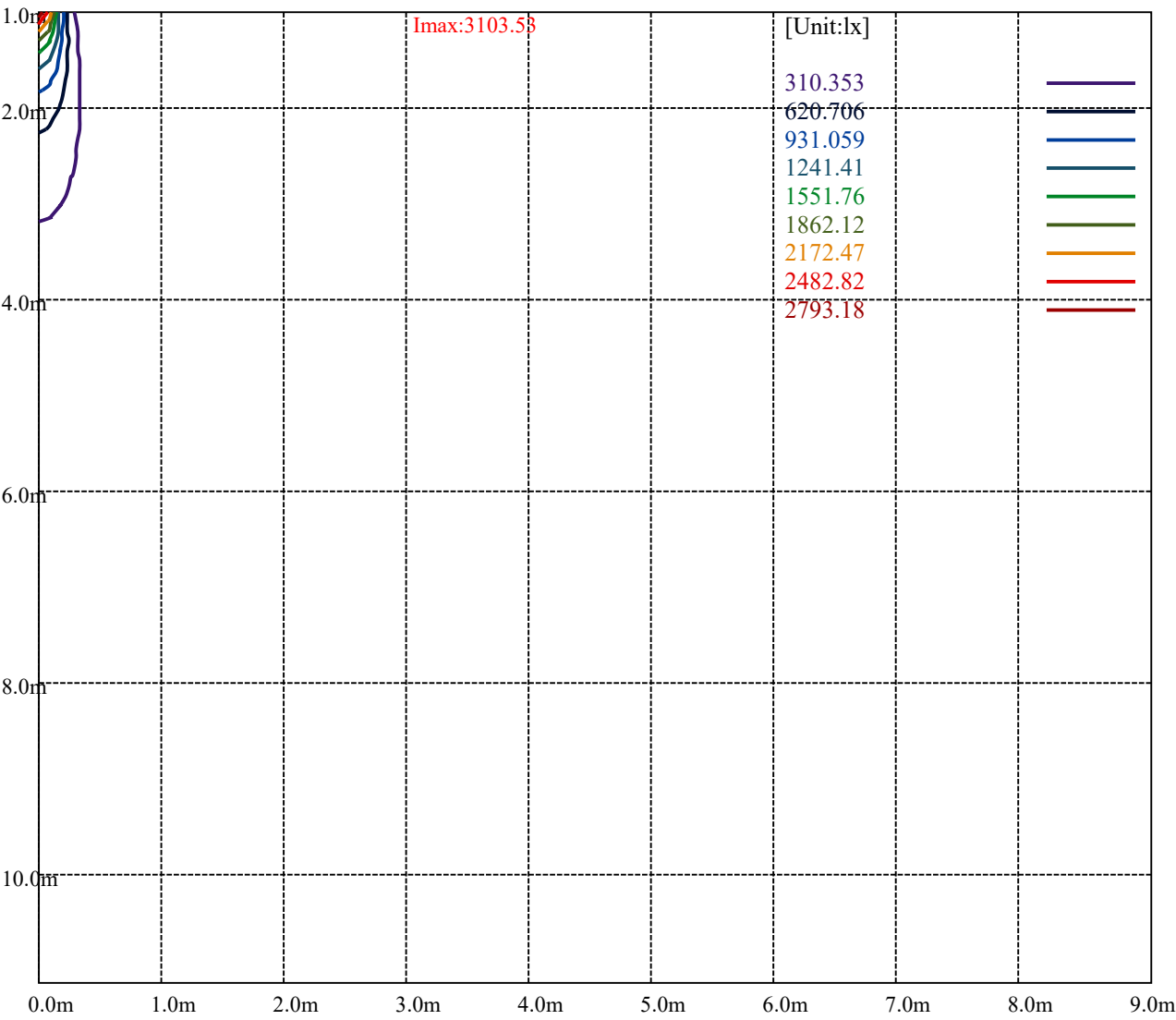


|       |                     |      |
|-------|---------------------|------|
| House | [Unit:cd]           | Road |
|       | <b>Imax:3103.53</b> |      |
|       | (10%Imax) 310.353   | —    |
|       | (20%Imax) 620.706   | —    |
|       | (30%Imax) 931.059   | —    |
|       | (40%Imax) 1241.41   | —    |
|       | (50%Imax) 1551.76   | —    |
|       | (60%Imax) 1862.12   | —    |
|       | (70%Imax) 2172.47   | —    |
|       | (80%Imax) 2482.82   | —    |
|       | (90%Imax) 2793.18   | —    |





|           |          |  |
|-----------|----------|--|
| (10%Emax) | 34.48355 |  |
| (20%Emax) | 68.96722 |  |
| (30%Emax) | 103.4508 |  |
| (40%Emax) | 137.9344 |  |
| (50%Emax) | 172.4178 |  |
| (60%Emax) | 206.9011 |  |
| (70%Emax) | 241.3856 |  |
| (80%Emax) | 275.8689 |  |
| (90%Emax) | 310.3522 |  |



Luminance Table

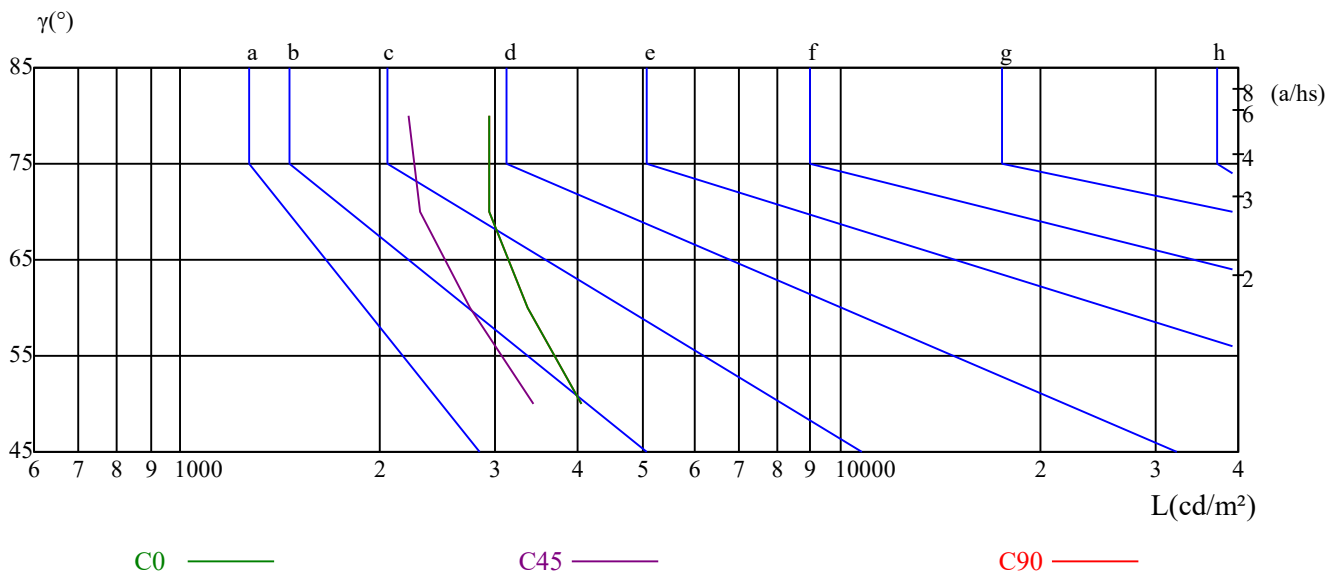
| $\gamma$ | 45 | 50   | 55 | 60   | 65 | 70   | 75 | 80   | 85 |
|----------|----|------|----|------|----|------|----|------|----|
| C0       | 0  | 4052 | 0  | 3362 | 0  | 2938 | 0  | 2939 | 0  |
| C45      | 0  | 3415 | 0  | 2744 | 0  | 2312 | 0  | 2210 | 0  |
| C90      | 0  | 4052 | 0  | 3362 | 0  | 2938 | 0  | 2939 | 0  |

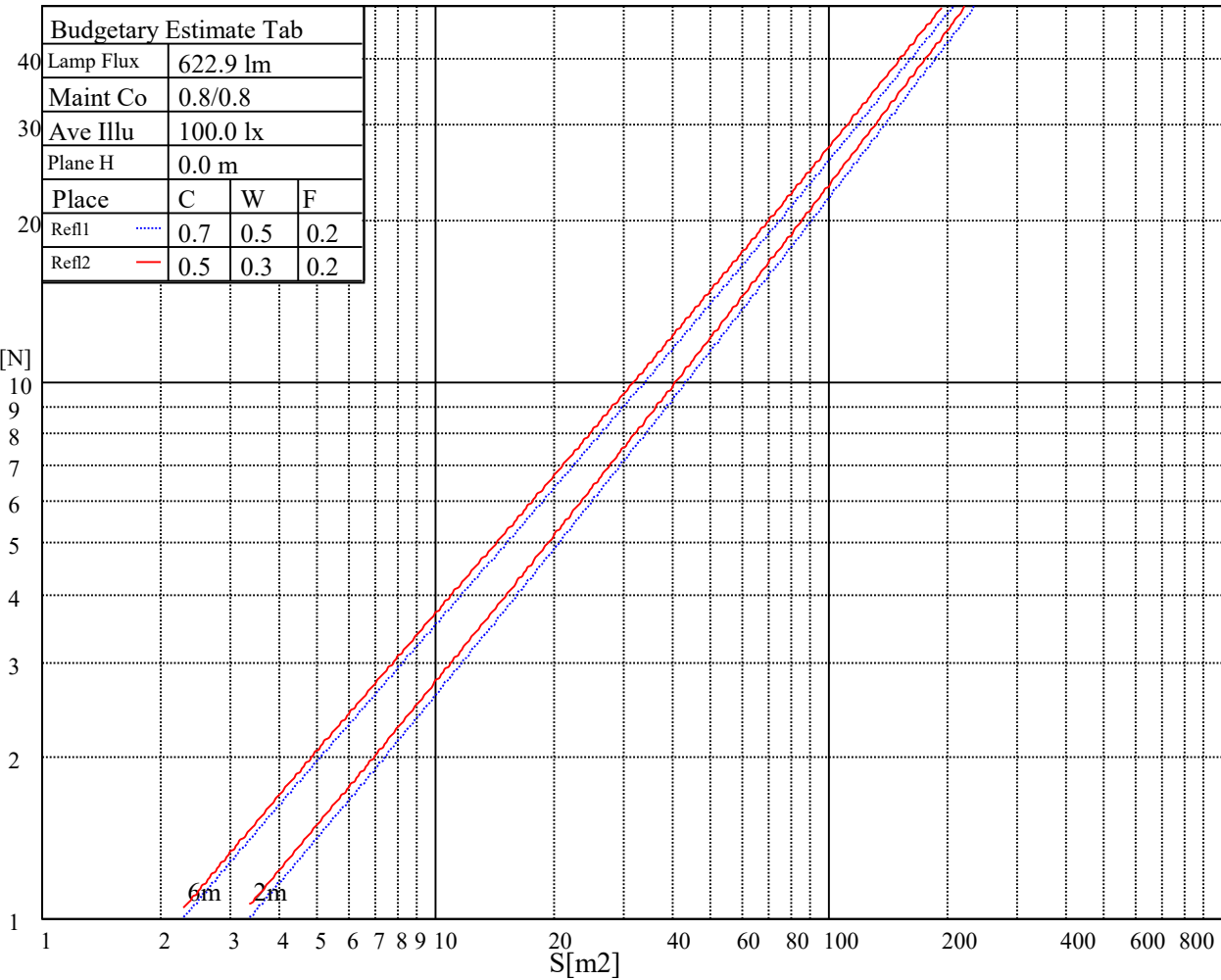
| L(Hor)(65) | L(Ver)(65) | L45(65) | L(Hor)(75) | L(Ver)(75) | L45(75) | L(Hor)(85) | L(Ver)(85) | L45(85) |
|------------|------------|---------|------------|------------|---------|------------|------------|---------|
| 0          | 0          | 0       | 0          | 0          | 0       | 0          | 0          | 0       |

Glare Table

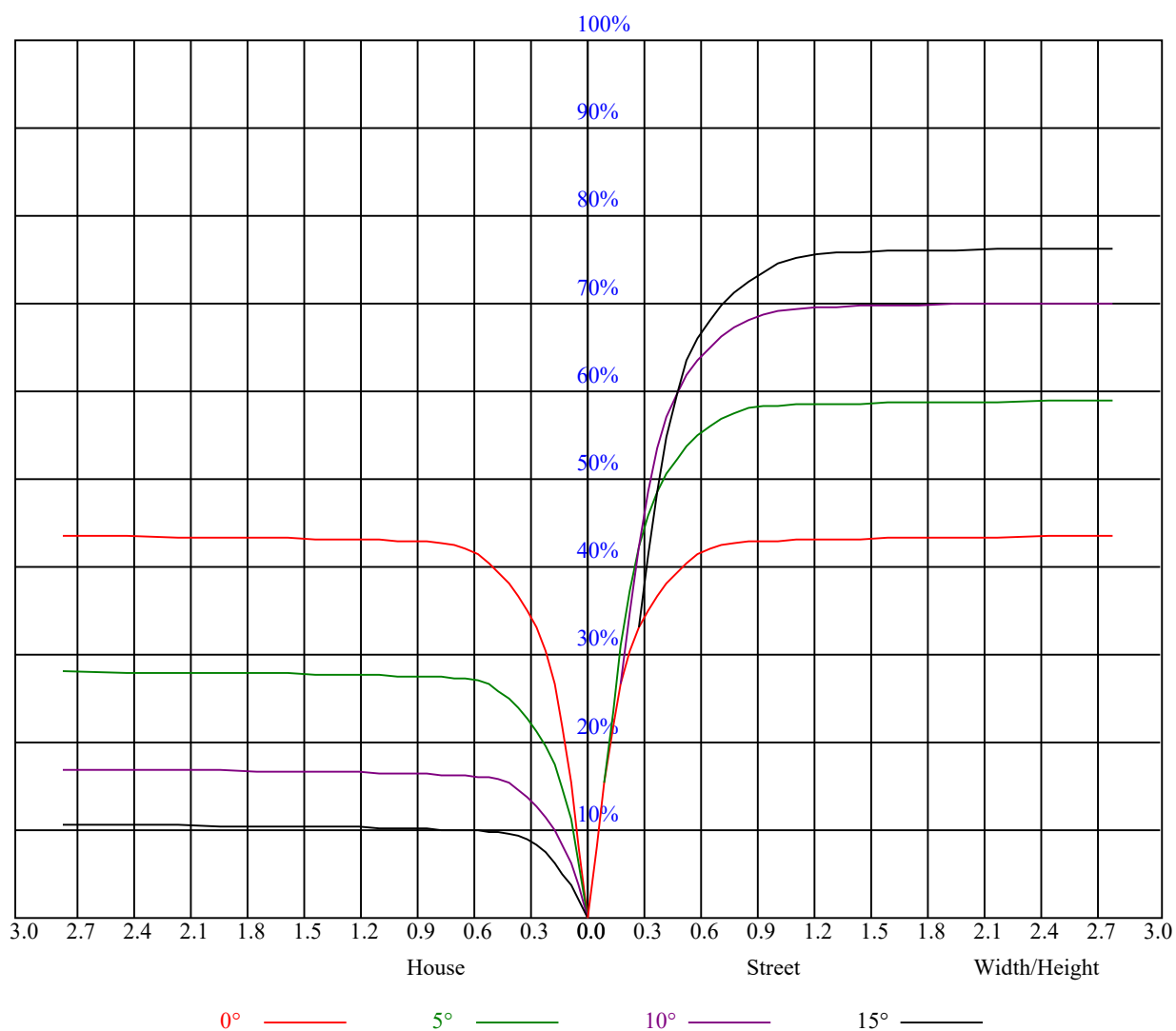
| Glare | Quality | Service Values Illuminance(lx) |      |      |            |            |            |            |            |
|-------|---------|--------------------------------|------|------|------------|------------|------------|------------|------------|
| 1.15  | A       | 2000            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

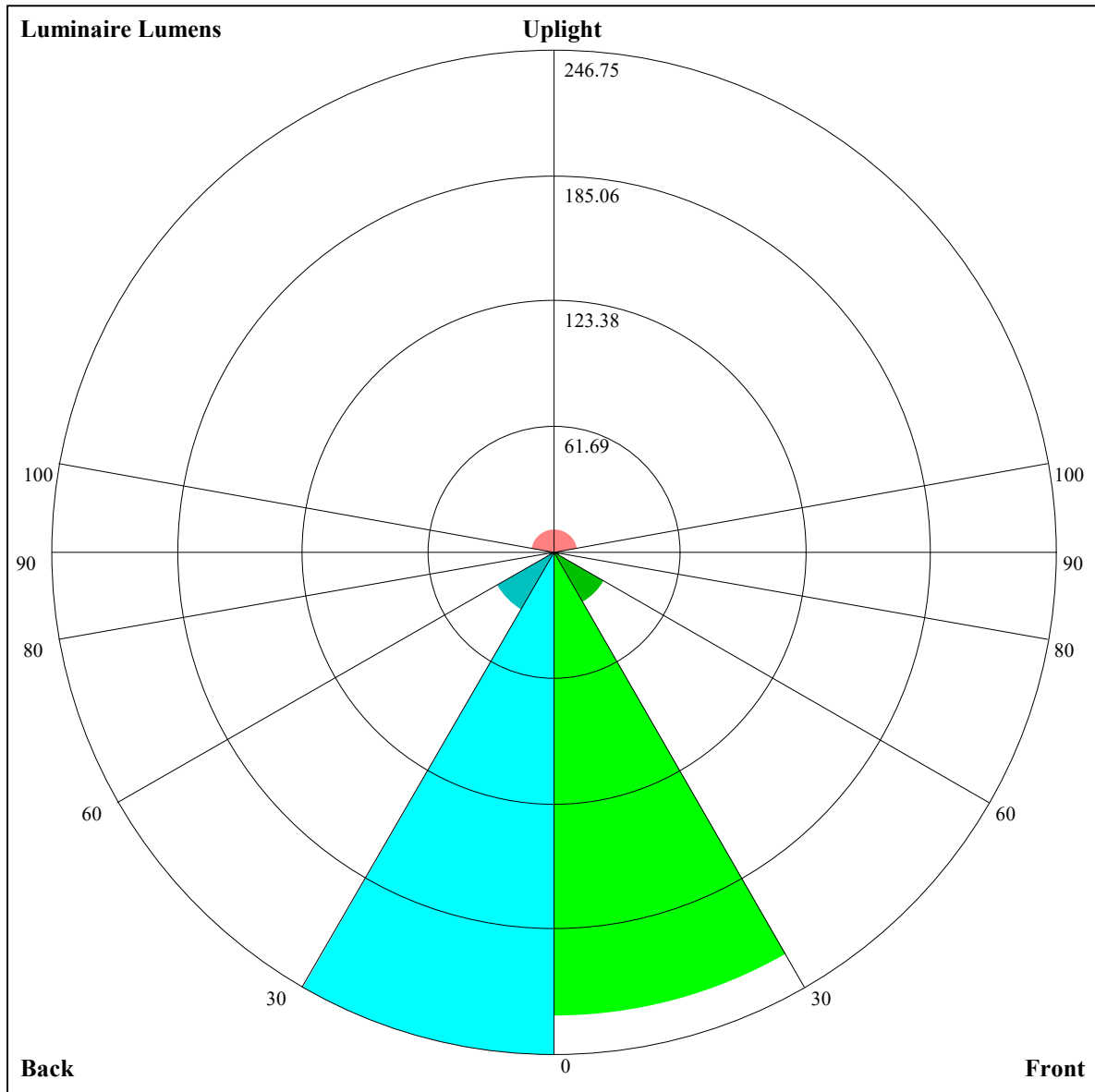
Luminance Limiting Curve





| 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    | 1.05                                    | 1.05 | 1.05 | 1.02 | 1.02 | 1.02 | 0.98 | 0.98 | 0.98 | 0.93 | 0.93 | 0.93 | 0.90 | 0.90 | 0.90 | 0.88 |
| 1    | 0.98                                    | 0.96 | 0.94 | 0.96 | 0.94 | 0.93 | 0.93 | 0.91 | 0.90 | 0.89 | 0.88 | 0.87 | 0.86 | 0.86 | 0.85 | 0.83 |
| 2    | 0.93                                    | 0.90 | 0.88 | 0.92 | 0.89 | 0.87 | 0.89 | 0.87 | 0.85 | 0.86 | 0.85 | 0.83 | 0.84 | 0.83 | 0.81 | 0.80 |
| 3    | 0.89                                    | 0.86 | 0.83 | 0.88 | 0.85 | 0.82 | 0.86 | 0.83 | 0.81 | 0.84 | 0.81 | 0.80 | 0.82 | 0.80 | 0.78 | 0.77 |
| 4    | 0.85                                    | 0.82 | 0.79 | 0.84 | 0.81 | 0.78 | 0.83 | 0.80 | 0.77 | 0.81 | 0.79 | 0.77 | 0.80 | 0.77 | 0.76 | 0.75 |
| 5    | 0.82                                    | 0.78 | 0.75 | 0.81 | 0.78 | 0.75 | 0.80 | 0.77 | 0.74 | 0.79 | 0.76 | 0.74 | 0.77 | 0.75 | 0.73 | 0.72 |
| 6    | 0.79                                    | 0.75 | 0.73 | 0.79 | 0.75 | 0.72 | 0.77 | 0.74 | 0.72 | 0.76 | 0.74 | 0.71 | 0.75 | 0.73 | 0.71 | 0.70 |
| 7    | 0.77                                    | 0.73 | 0.70 | 0.76 | 0.73 | 0.70 | 0.75 | 0.72 | 0.70 | 0.74 | 0.71 | 0.69 | 0.73 | 0.71 | 0.69 | 0.68 |
| 8    | 0.74                                    | 0.71 | 0.68 | 0.74 | 0.70 | 0.68 | 0.73 | 0.70 | 0.68 | 0.72 | 0.69 | 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 | 0.66 | 0.70 | 0.68 | 0.65 | 0.70 | 0.67 | 0.65 | 0.64 |
| 10   | 0.70                                    | 0.67 | 0.64 | 0.70 | 0.66 | 0.64 | 0.69 | 0.66 | 0.64 | 0.69 | 0.66 | 0.64 | 0.68 | 0.66 | 0.64 | 0.63 |





Luminaire Lumens:

FL=228.35,FM=28.62,FH=3.08,FVH=1.31

BL=246.75,BM=32.48,BH=3.19,BVH=1.31

UL=2.42,UH=11.51

BUG Rating:B1-U2-G0

## Nata 1654-N

| Intensity data(cd)         |         |         |         |         |         |         |         |        |        |
|----------------------------|---------|---------|---------|---------|---------|---------|---------|--------|--------|
| Appendix Page: 16 Total:17 |         |         |         |         |         |         |         |        |        |
| C/γ(°)                     | 0.0     | 2.0     | 4.0     | 6.0     | 8.0     | 10.0    | 12.0    | 14.0   | 16.0   |
| 0.0                        | 3113.99 | 2984.06 | 2688.40 | 2249.60 | 1773.37 | 1293.27 | 938.16  | 625.99 | 429.44 |
| 45.0                       | 3101.88 | 2993.97 | 2746.21 | 2316.77 | 1863.11 | 1371.45 | 956.88  | 637.00 | 430.54 |
| 90.0                       | 3106.83 | 3043.52 | 2813.38 | 2428.54 | 1924.22 | 1462.30 | 1003.24 | 648.84 | 458.73 |
| 135.0                      | 3091.42 | 3116.19 | 2992.87 | 2646.56 | 2198.95 | 1745.84 | 1244.83 | 835.21 | 557.72 |
| 180.0                      | 3113.99 | 3081.51 | 2874.49 | 2485.80 | 2038.74 | 1525.61 | 1086.04 | 743.32 | 499.97 |
| 225.0                      | 3101.88 | 3038.01 | 2804.02 | 2410.37 | 1919.82 | 1441.93 | 1012.38 | 671.63 | 461.70 |
| 270.0                      | 3106.83 | 3009.38 | 2759.98 | 2325.03 | 1851.55 | 1387.97 | 980.00  | 652.97 | 438.25 |
| 315.0                      | 3091.42 | 2914.69 | 2581.59 | 2130.68 | 1625.82 | 1095.57 | 830.91  | 565.26 | 391.67 |
| 360.0                      | 3113.99 | 2984.06 | 2688.40 | 2249.60 | 1773.37 | 1293.27 | 938.16  | 625.99 | 429.44 |
| C/γ(°)                     | 18.0    | 20.0    | 22.0    | 24.0    | 26.0    | 28.0    | 30.0    | 32.0   | 34.0   |
| 0.0                        | 322.63  | 278.59  | 242.47  | 223.97  | 211.53  | 201.07  | 182.18  | 140.12 | 94.09  |
| 45.0                       | 312.72  | 263.94  | 224.19  | 204.64  | 194.29  | 187.96  | 177.23  | 144.03 | 98.94  |
| 90.0                       | 317.90  | 259.15  | 226.56  | 206.85  | 193.19  | 181.41  | 164.40  | 132.80 | 96.62  |
| 135.0                      | 384.84  | 293.45  | 256.18  | 232.72  | 220.72  | 210.32  | 201.73  | 179.59 | 136.87 |
| 180.0                      | 351.20  | 282.00  | 247.64  | 229.75  | 218.79  | 208.17  | 198.81  | 168.97 | 124.81 |
| 225.0                      | 320.59  | 261.52  | 228.54  | 206.13  | 192.15  | 182.51  | 170.73  | 140.01 | 103.01 |
| 270.0                      | 312.17  | 250.89  | 223.42  | 205.03  | 196.66  | 189.67  | 176.57  | 140.72 | 98.61  |
| 315.0                      | 299.78  | 262.34  | 234.71  | 218.41  | 207.78  | 199.08  | 171.17  | 127.84 | 80.55  |
| 360.0                      | 322.63  | 278.59  | 242.47  | 223.97  | 211.53  | 201.07  | 182.18  | 140.12 | 94.09  |
| C/γ(°)                     | 36.0    | 38.0    | 40.0    | 42.0    | 44.0    | 46.0    | 48.0    | 50.0   | 52.0   |
| 0.0                        | 48.50   | 16.90   | 8.26    | 6.94    | 5.51    | 5.01    | 4.57    | 4.29   | 3.96   |
| 45.0                       | 55.33   | 22.13   | 10.90   | 9.19    | 7.76    | 7.32    | 6.66    | 6.39   | 5.95   |
| 90.0                       | 58.80   | 30.39   | 13.65   | 10.24   | 7.82    | 6.77    | 6.06    | 5.67   | 5.34   |
| 135.0                      | 88.86   | 42.28   | 15.47   | 8.86    | 6.66    | 4.90    | 4.40    | 3.91   | 3.69   |
| 180.0                      | 75.37   | 34.25   | 10.19   | 7.60    | 5.56    | 4.62    | 4.18    | 3.80   | 3.52   |
| 225.0                      | 59.46   | 24.72   | 11.78   | 8.86    | 6.55    | 5.67    | 5.01    | 4.57   | 4.57   |
| 270.0                      | 55.83   | 23.45   | 11.18   | 9.36    | 7.98    | 7.32    | 6.66    | 6.00   | 5.40   |
| 315.0                      | 36.12   | 12.50   | 7.87    | 6.39    | 5.18    | 4.84    | 4.40    | 4.18   | 3.85   |
| 360.0                      | 48.50   | 16.90   | 8.26    | 6.94    | 5.51    | 5.01    | 4.57    | 4.29   | 3.96   |
| C/γ(°)                     | 54.0    | 56.0    | 58.0    | 60.0    | 62.0    | 64.0    | 66.0    | 68.0   | 70.0   |
| 0.0                        | 3.80    | 3.52    | 3.41    | 3.30    | 3.08    | 2.97    | 2.97    | 2.86   | 2.81   |
| 45.0                       | 5.45    | 4.96    | 4.57    | 4.13    | 3.80    | 3.41    | 3.14    | 2.97   | 2.86   |
| 90.0                       | 5.23    | 5.07    | 4.84    | 4.73    | 4.51    | 4.18    | 3.85    | 3.52   | 3.14   |
| 135.0                      | 3.52    | 3.36    | 3.36    | 3.30    | 3.36    | 3.36    | 3.41    | 3.36   | 3.25   |
| 180.0                      | 3.47    | 3.41    | 3.30    | 3.25    | 3.19    | 3.14    | 3.08    | 3.08   | 2.92   |
| 225.0                      | 4.68    | 4.57    | 4.51    | 4.29    | 4.07    | 3.80    | 3.52    | 3.25   | 3.08   |
| 270.0                      | 4.90    | 4.46    | 4.18    | 3.91    | 3.69    | 3.36    | 3.19    | 2.97   | 2.92   |
| 315.0                      | 3.74    | 3.58    | 3.36    | 3.25    | 3.03    | 2.97    | 2.92    | 2.86   | 2.81   |
| 360.0                      | 3.80    | 3.52    | 3.41    | 3.30    | 3.08    | 2.97    | 2.97    | 2.86   | 2.81   |
| C/γ(°)                     | 72.0    | 74.0    | 76.0    | 78.0    | 80.0    | 82.0    | 84.0    | 86.0   | 88.0   |
| 0.0                        | 2.75    | 2.70    | 2.64    | 2.59    | 2.53    | 2.48    | 2.42    | 2.48   | 2.37   |
| 45.0                       | 2.81    | 2.75    | 2.70    | 2.64    | 2.59    | 2.53    | 2.42    | 2.31   | 2.20   |
| 90.0                       | 2.86    | 2.75    | 2.64    | 2.59    | 2.53    | 2.48    | 2.42    | 2.31   | 2.20   |
| 135.0                      | 3.03    | 2.86    | 2.70    | 2.64    | 2.53    | 2.48    | 2.42    | 2.42   | 2.26   |
| 180.0                      | 2.86    | 2.75    | 2.70    | 2.59    | 2.53    | 2.48    | 2.42    | 2.53   | 2.31   |
| 225.0                      | 2.86    | 2.81    | 2.75    | 2.70    | 2.64    | 2.59    | 2.48    | 2.48   | 2.31   |
| 270.0                      | 2.81    | 2.75    | 2.70    | 2.64    | 2.64    | 2.53    | 2.48    | 2.42   | 2.26   |
| 315.0                      | 2.75    | 2.70    | 2.64    | 2.59    | 2.48    | 2.42    | 2.42    | 2.42   | 2.31   |
| 360.0                      | 2.75    | 2.70    | 2.64    | 2.59    | 2.53    | 2.48    | 2.42    | 2.48   | 2.37   |



## Intensity data(cd)

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|                 |      |
|-----------------|------|
| C/ $\gamma$ (°) | 90.0 |
| 0.0             | 2.26 |
| 45.0            | 2.20 |
| 90.0            | 2.20 |
| 135.0           | 2.20 |
| 180.0           | 2.20 |
| 225.0           | 2.20 |
| 270.0           | 2.20 |
| 315.0           | 2.26 |
| 360.0           | 2.26 |