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## Nata

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LumCAT: 3-1550-A3

Luminaire: 99.02.73.172+92.76.365.00

Report No: NATA0100

Voltage(V): 34.5000

Test No: GC2018082817

Current(A): 0.5000

LampCAT: SAMSUNG LC026D

Power (W): 17.2500

Lamp flux(lm): 2486.0

PF: 0.0000

Number of Lamps: 1

Ballast type: DC

Length(mm): 78

Width(mm): 78

Phm Type: C

Height(mm): 0

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## Photometric Results

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Lumens(lm): 2279.01

Efficiency(%): 91.67%

Lumens(lm)/Power(W): 132.12

Central intensity(cd): 3910.106

Maximum intensity(cd): 3910.106

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

Beam Angle(50%Imax): [C0/180]Total=44.0

[C90/270]Total=44.0

Field angle(10%Imax): [C0/180]Total=73.9

[C90/270]Total=73.9

Maximum s/h(1/2): C0\_180=0.69 C90\_270=0.69

Maximum s/h(1/4): C0\_180=0.73 C90\_270=0.73

Up flux rate of lamp(%): 0.00%

Down flux rate of lamp(%): 92.53%

Up flux rate of LUM(%): - -

Down flux rate of LUM(%): 100.00%

CIE Type : Direct lighting

Output flux ratio in  $\pi$  solid angle : 97.745%

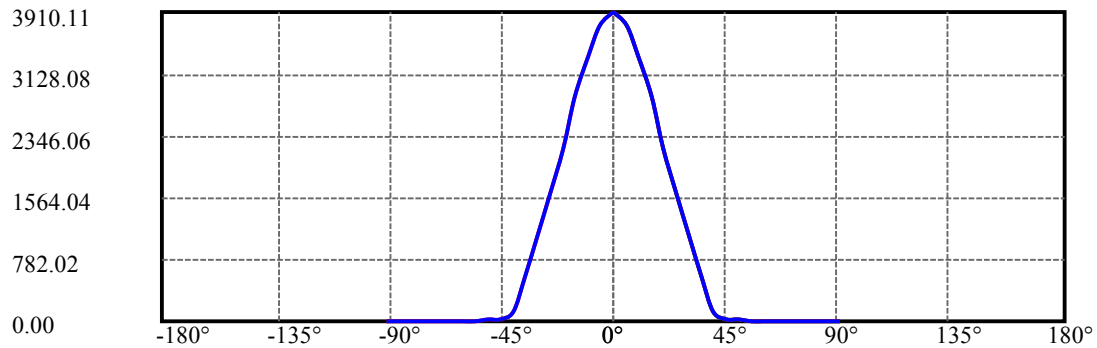
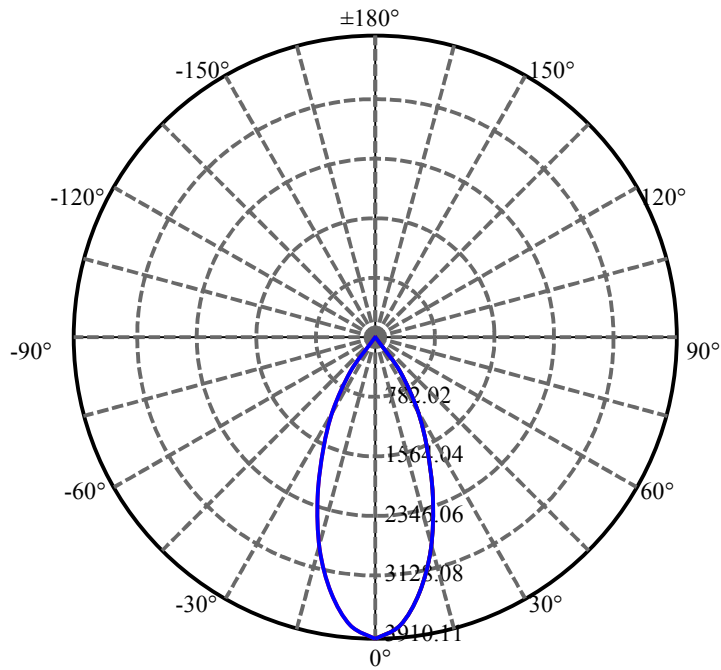
| $\gamma(^{\circ})$ | Average I(cd) | Zonal F(lm) | Sum F(lm) | Eff Flux(%) | Eff Sum(%) |
|--------------------|---------------|-------------|-----------|-------------|------------|
| 0.0                | 3910.106      | 23.383      | 23.383    | .941%       | 1.026%     |
| 5.0                | 3743.560      | 178.842     | 202.226   | 7.194%      | 8.873%     |
| 10.0               | 3353.898      | 319.234     | 521.46    | 12.841%     | 22.881%    |
| 15.0               | 2833.271      | 401.952     | 923.411   | 16.169%     | 40.518%    |
| 20.0               | 2193.034      | 411.137     | 1334.548  | 16.538%     | 58.558%    |
| 25.0               | 1592.988      | 369.020     | 1703.569  | 14.844%     | 74.750%    |
| 30.0               | 1105.546      | 302.996     | 2006.564  | 12.188%     | 88.045%    |
| 35.0               | 561.548       | 176.550     | 2183.114  | 7.102%      | 95.792%    |
| 40.0               | 121.916       | 42.955      | 2226.069  | 1.728%      | 97.677%    |
| 45.0               | 16.696        | 6.471       | 2232.541  | .260%       | 97.961%    |
| 50.0               | 12.477        | 5.239       | 2237.78   | .211%       | 98.191%    |
| 55.0               | 11.693        | 5.250       | 2243.03   | .211%       | 98.421%    |
| 60.0               | 11.218        | 5.325       | 2248.355  | .214%       | 98.655%    |
| 65.0               | 10.894        | 5.412       | 2253.767  | .218%       | 98.892%    |
| 70.0               | 10.688        | 5.505       | 2259.272  | .221%       | 99.134%    |
| 75.0               | 10.509        | 5.564       | 2264.836  | .224%       | 99.378%    |
| 80.0               | 10.392        | 5.610       | 2270.446  | .226%       | 99.624%    |
| 85.0               | 10.585        | 5.780       | 2276.225  | .232%       | 99.878%    |
| 90.0               | 10.158        | 2.784       | 2279.009  | .112%       | 100.000%   |

## ZONAL LUMEN SUMMARY

| Zone    | Lumens  | %Lamp  | %Fixt   |
|---------|---------|--------|---------|
| 0-30    | 2006.56 | 80.71% | 88.05%  |
| 0-40    | 2226.07 | 89.54% | 97.68%  |
| 0-60    | 2248.35 | 90.44% | 98.65%  |
| 0-90    | 2276.23 | 91.56% | 99.88%  |
| 0-120   | 2276.23 | 91.56% | 99.88%  |
| 0-180   | 2279.01 | 91.67% | 100.00% |
| 60-90   | 33.20   | 1.34%  | 1.46%   |
| 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%   |
| 0-26.97 | 1823.21 | 73.34% | 80.00%  |

## ZONAL LUMEN SUMMARY

|         |        |
|---------|--------|
| 0-10    | 521.46 |
| 10-20   | 813.09 |
| 20-30   | 672.02 |
| 30-40   | 219.51 |
| 40-50   | 11.71  |
| 50-60   | 10.58  |
| 60-70   | 10.92  |
| 70-80   | 11.17  |
| 80-90   | 5.78   |
| 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   |



C0(Max): —————

C0/C180: —————

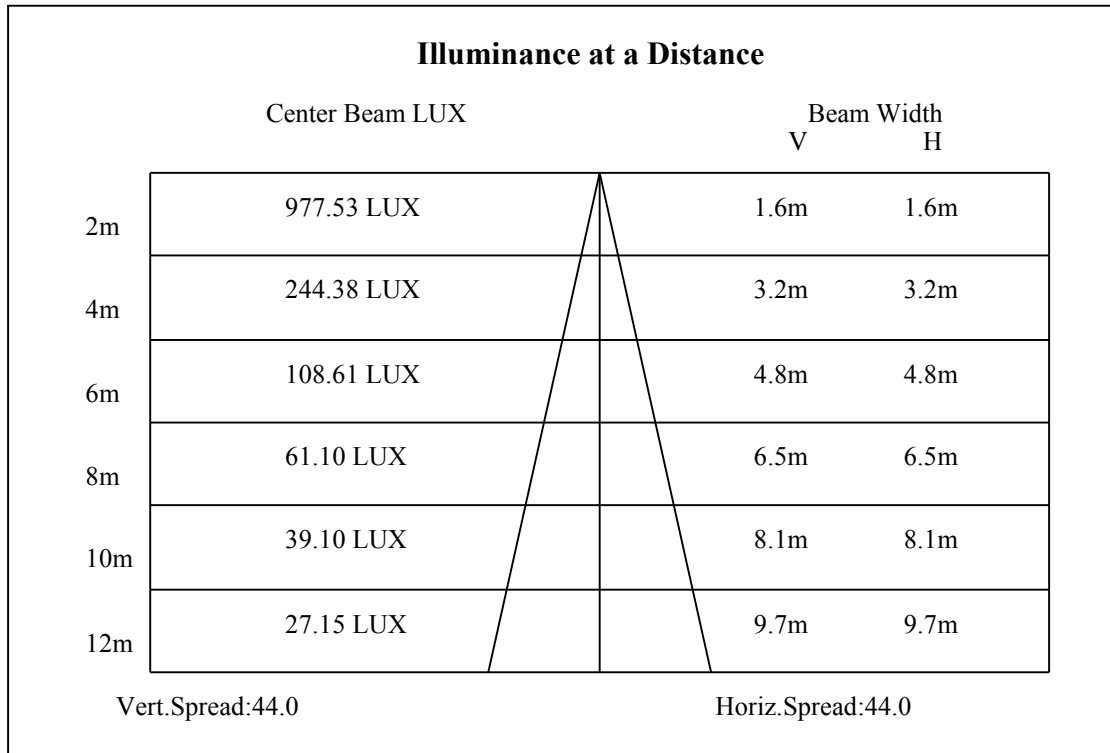
C90/C270: —————

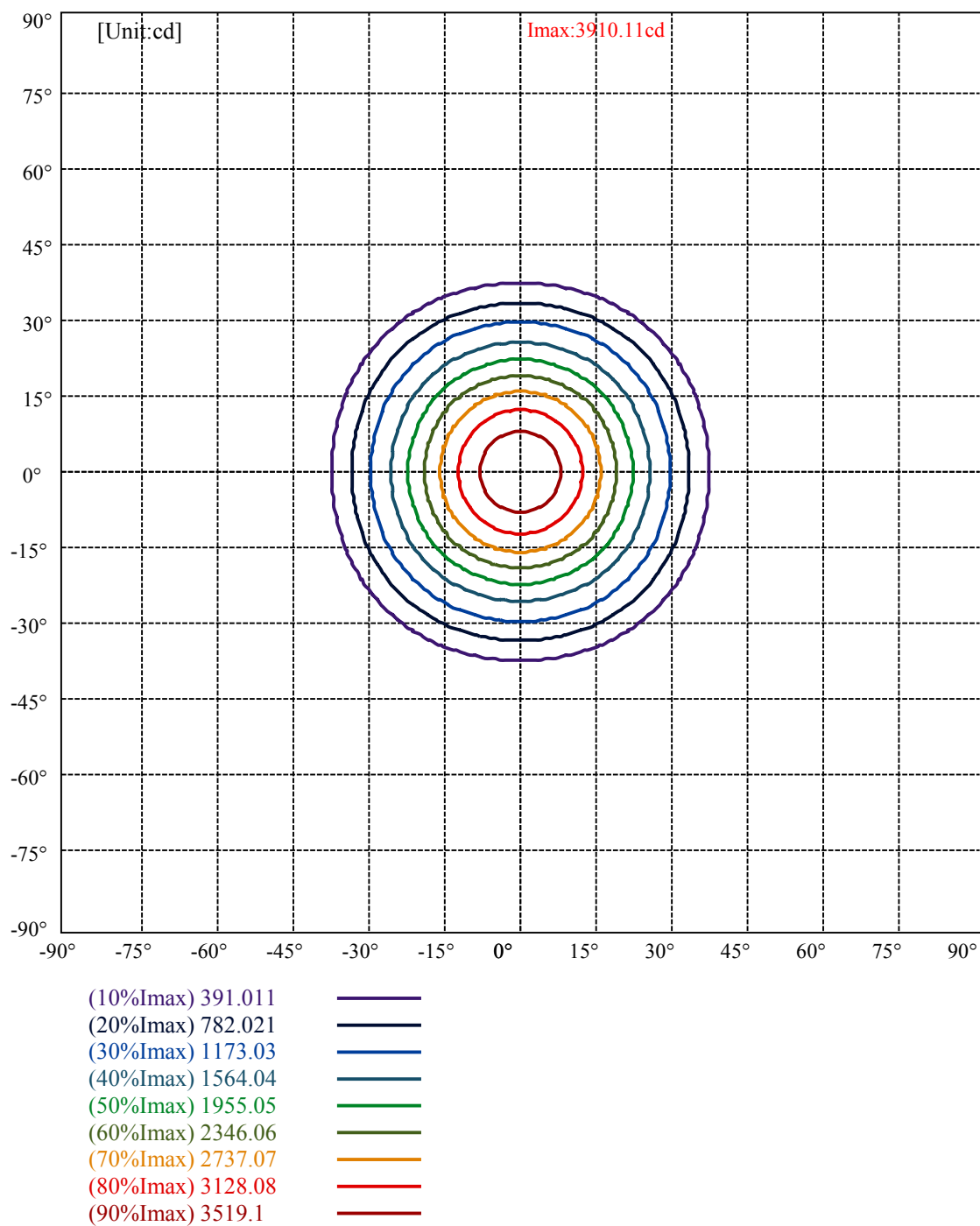
Field angle(10%Imax):C0/180Left:36.9 Right:36.9

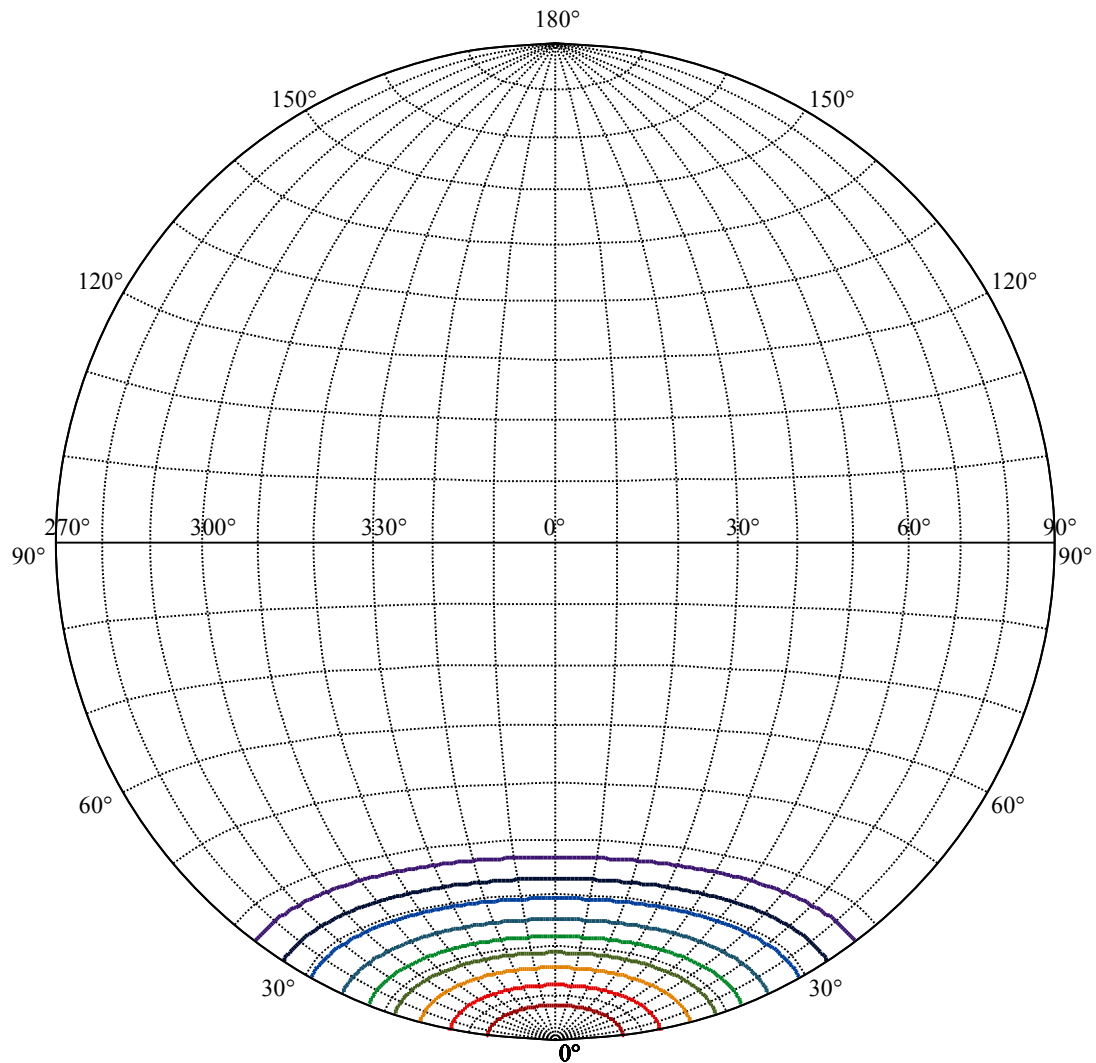
:C90/270Left:36.9 Right:36.9

Beam Angle(50%Imax):C0/180Left:22.0 Right:22.0

:C90/270Left:22.0 Right:22.0







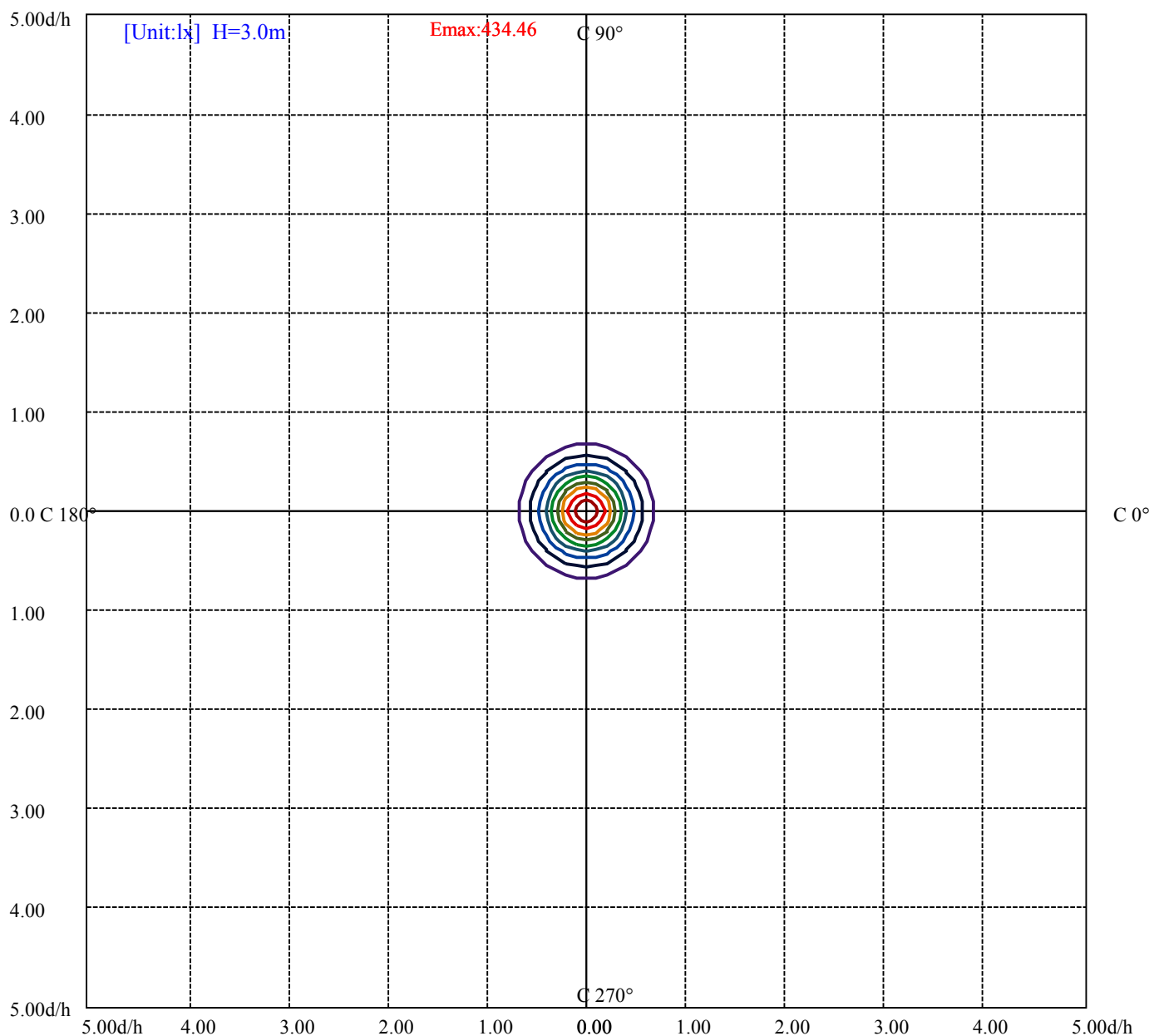
House

[Unit:cd]

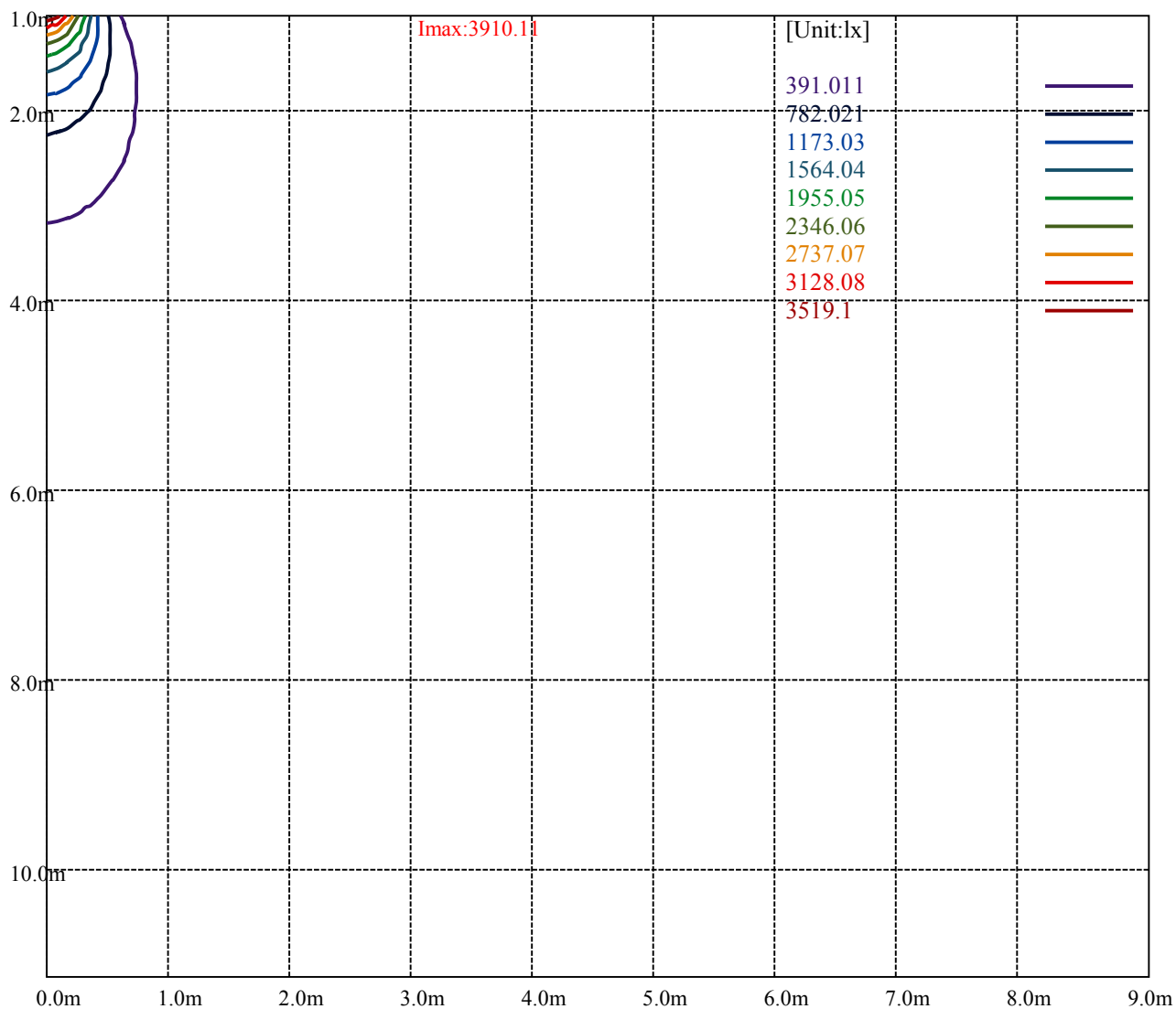
Road

**Imax:3910.11**

|           |         |   |
|-----------|---------|---|
| (10%Imax) | 391.011 | — |
| (20%Imax) | 782.021 | — |
| (30%Imax) | 1173.03 | — |
| (40%Imax) | 1564.04 | — |
| (50%Imax) | 1955.05 | — |
| (60%Imax) | 2346.06 | — |
| (70%Imax) | 2737.07 | — |
| (80%Imax) | 3128.08 | — |
| (90%Imax) | 3519.1  | — |



|           |          |                                                                                     |
|-----------|----------|-------------------------------------------------------------------------------------|
| (10%Emax) | 43.44556 |  |
| (20%Emax) | 86.89111 |  |
| (30%Emax) | 130.3367 |  |
| (40%Emax) | 173.7822 |  |
| (50%Emax) | 217.2278 |  |
| (60%Emax) | 260.6733 |  |
| (70%Emax) | 304.1189 |  |
| (80%Emax) | 347.5645 |  |
| (90%Emax) | 391.01   |  |



Luminance Table

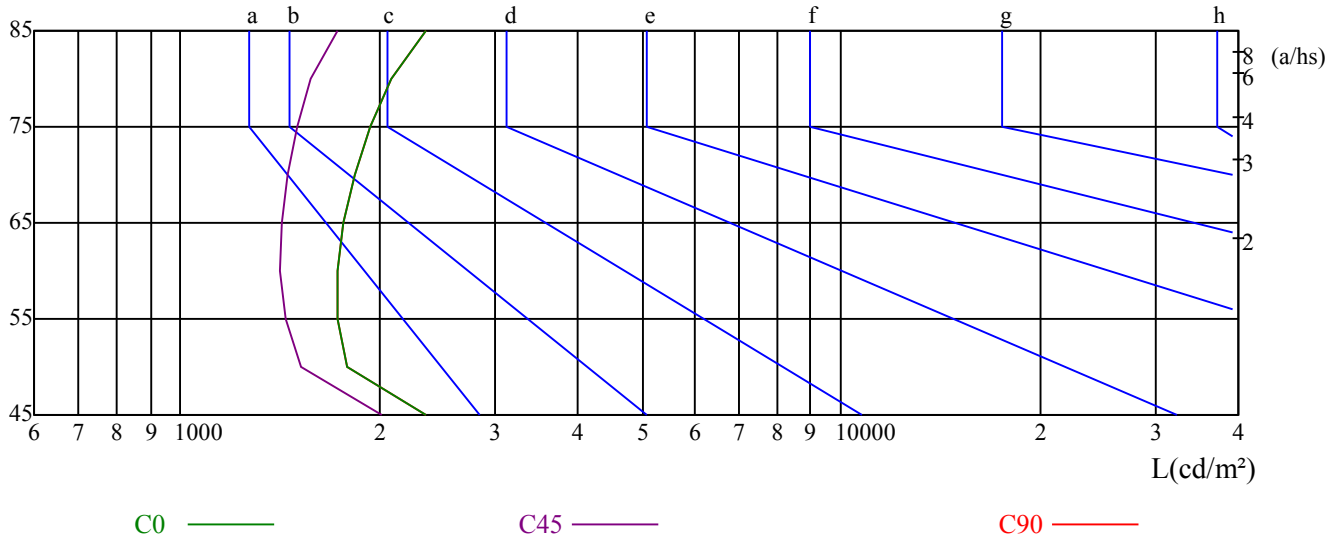
| $\gamma$ | 45   | 50   | 55   | 60   | 65   | 70   | 75   | 80   | 85   |
|----------|------|------|------|------|------|------|------|------|------|
| C0       | 2347 | 1793 | 1733 | 1729 | 1764 | 1837 | 1940 | 2089 | 2356 |
| C45      | 2016 | 1518 | 1444 | 1417 | 1420 | 1451 | 1499 | 1575 | 1725 |
| C90      | 2347 | 1793 | 1733 | 1729 | 1764 | 1837 | 1940 | 2089 | 2356 |

| L(Hor)(65) | L(Ver)(65) | L45(65) | L(Hor)(75) | L(Ver)(75) | L45(75) | L(Hor)(85) | L(Ver)(85) | L45(85) |
|------------|------------|---------|------------|------------|---------|------------|------------|---------|
| 4237       | 4237       | 4237    | 6674       | 6674       | 6674    | 19961      | 19961      | 19961   |

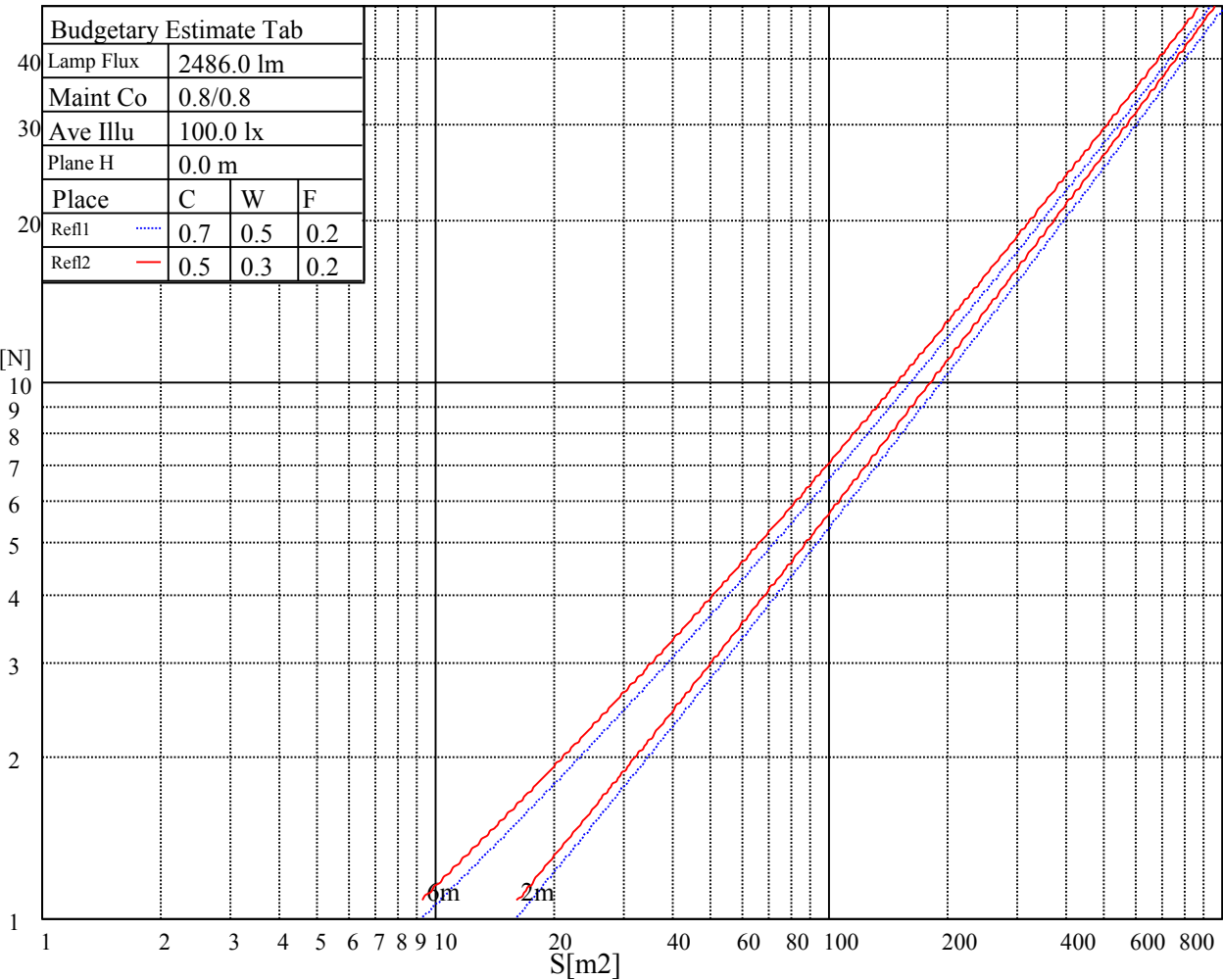
Glare Table

| 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          |

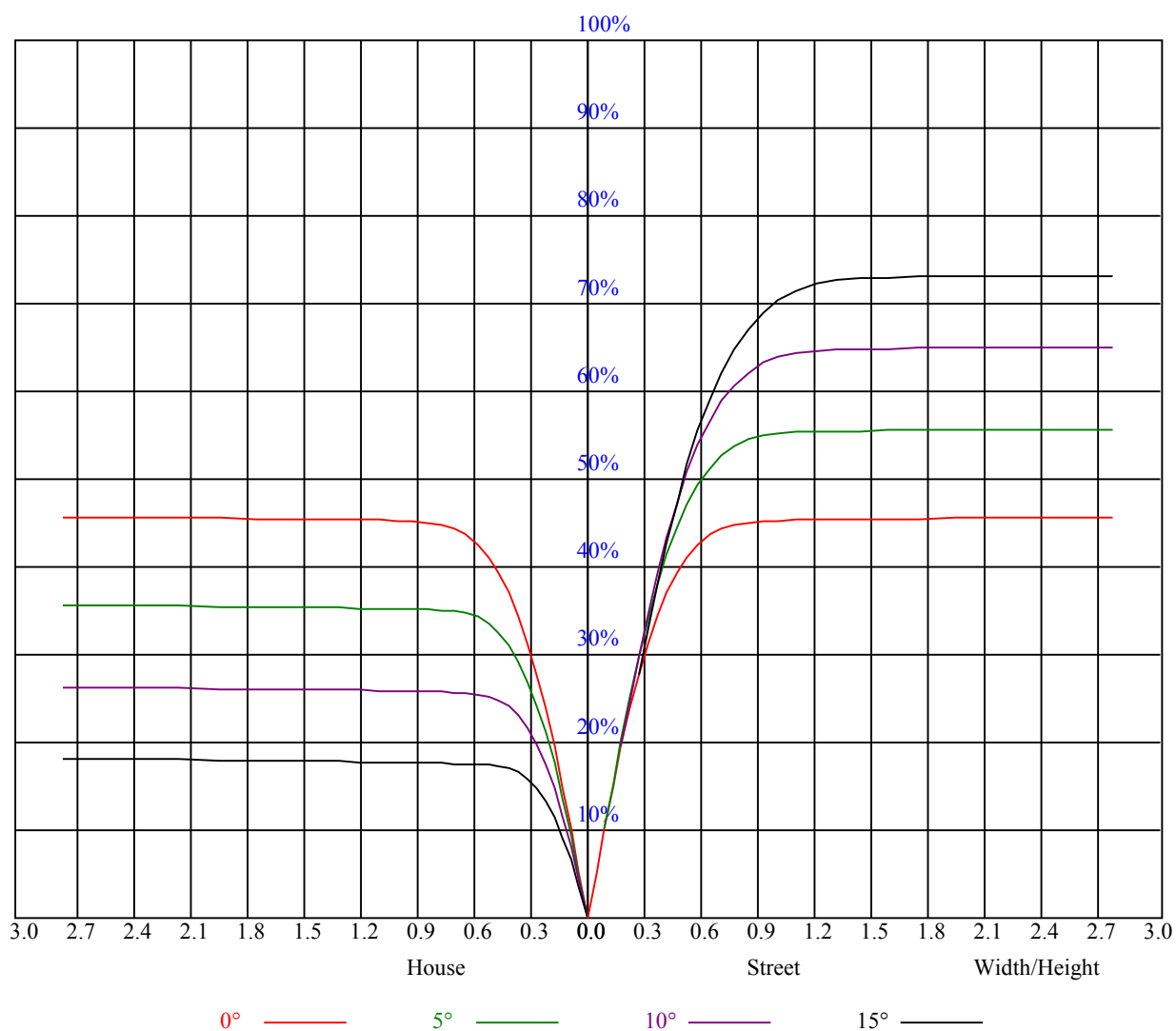
Luminance Limiting Curve

 $\gamma(^{\circ})$ 

| Illumination assessment according UGR             |     |                  |      |      |      |       |                |      |      |      |       |
|---------------------------------------------------|-----|------------------|------|------|------|-------|----------------|------|------|------|-------|
| Rf of Ceiling                                     |     | 70               | 70   | 50   | 50   | 30    | 70             | 70   | 50   | 50   | 30    |
| Rf of Wall                                        |     | 50               | 30   | 50   | 30   | 30    | 50             | 30   | 50   | 30   | 30    |
| Rf of Floor                                       |     | 20               | 20   | 20   | 20   | 20    | 20             | 20   | 20   | 20   | 20    |
| Room dimensions                                   |     | Viewed crosswise |      |      |      |       | Viewed endwise |      |      |      |       |
| X                                                 | Y   |                  |      |      |      |       |                |      |      |      |       |
| 2H                                                | 2H  | 0.42             | 1.33 | 0.78 | 1.64 | 1.96  | 0.39           | 1.31 | 0.76 | 1.62 | 1.94  |
|                                                   | 3H  | 2.67             | 3.48 | 3.06 | 3.82 | 4.19  | 2.66           | 3.47 | 3.04 | 3.80 | 4.17  |
|                                                   | 4H  | 3.90             | 4.65 | 4.31 | 5.00 | 5.40  | 3.89           | 4.64 | 4.30 | 4.99 | 5.38  |
|                                                   | 6H  | 5.20             | 5.89 | 5.62 | 6.26 | 6.66  | 5.19           | 5.87 | 5.61 | 6.25 | 6.65  |
|                                                   | 8H  | 5.87             | 6.51 | 6.31 | 6.91 | 7.32  | 5.84           | 6.48 | 6.28 | 6.87 | 7.28  |
|                                                   | 12H | 6.93             | 7.54 | 7.37 | 7.93 | 8.36  | 6.85           | 7.46 | 7.28 | 7.84 | 8.28  |
| 4H                                                | 2H  | 0.90             | 1.65 | 1.31 | 2.00 | 2.40  | 0.88           | 1.63 | 1.29 | 1.98 | 2.38  |
|                                                   | 3H  | 3.45             | 4.07 | 3.87 | 4.48 | 4.88  | 3.44           | 4.06 | 3.86 | 4.47 | 4.87  |
|                                                   | 4H  | 4.85             | 5.40 | 5.29 | 5.83 | 6.28  | 4.84           | 5.39 | 5.28 | 5.82 | 6.27  |
|                                                   | 6H  | 6.25             | 6.72 | 6.72 | 7.17 | 7.65  | 6.24           | 6.71 | 6.71 | 7.16 | 7.64  |
|                                                   | 8H  | 7.04             | 7.47 | 7.52 | 7.93 | 8.40  | 7.00           | 7.44 | 7.48 | 7.89 | 8.37  |
|                                                   | 12H | 8.09             | 8.47 | 8.59 | 8.96 | 9.44  | 8.01           | 8.39 | 8.50 | 8.88 | 9.35  |
| 8H                                                | 4H  | 5.28             | 5.72 | 5.76 | 6.17 | 6.65  | 5.28           | 5.71 | 5.75 | 6.16 | 6.64  |
|                                                   | 6H  | 6.93             | 7.27 | 7.44 | 7.78 | 8.26  | 6.91           | 7.26 | 7.43 | 7.76 | 8.25  |
|                                                   | 8H  | 7.87             | 8.18 | 8.40 | 8.70 | 9.20  | 7.84           | 8.14 | 8.37 | 8.67 | 9.16  |
|                                                   | 12H | 9.06             | 9.32 | 9.58 | 9.82 | 10.40 | 8.98           | 9.24 | 9.50 | 9.74 | 10.32 |
| 12H                                               | 4H  | 5.37             | 5.75 | 5.87 | 6.24 | 6.72  | 5.37           | 5.74 | 5.86 | 6.23 | 6.71  |
|                                                   | 6H  | 7.30             | 7.40 | 7.64 | 7.88 | 8.43  | 7.29           | 7.39 | 7.62 | 7.87 | 8.42  |
|                                                   | 8H  | 8.14             | 8.40 | 8.66 | 8.90 | 9.48  | 8.11           | 8.37 | 8.63 | 8.87 | 9.45  |
| Variation with the observer position at spacings: |     |                  |      |      |      |       |                |      |      |      |       |
| S = 1.0H                                          |     | 5.8/-9.0         |      |      |      |       | 5.8/-9.0       |      |      |      |       |
| S = 1.5H                                          |     | 8.3/-7.2         |      |      |      |       | 8.3/-7.2       |      |      |      |       |
| S = 2.0H                                          |     | 10.0/-5.8        |      |      |      |       | 10.0/-5.8      |      |      |      |       |
| Standard tables:                                  |     | BK1              |      |      |      |       | BK1            |      |      |      |       |
| Uncorrected UGR                                   |     | -2.0             |      |      |      |       | -2.0           |      |      |      |       |



| 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   | COEFFICIENTS OF UTILIZATION RHOFC=20 CU |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 0     | 1.10                                    | 1.10 | 1.10 | 1.08 | 1.08 | 1.08 | 1.03 | 1.03 | 1.03 | 0.98 | 0.98 | 0.98 | 0.94 | 0.94 | 0.94 | 0.93 |
| 1     | 1.02                                    | 1.00 | 0.98 | 1.00 | 0.98 | 0.96 | 0.96 | 0.95 | 0.93 | 0.93 | 0.92 | 0.90 | 0.90 | 0.89 | 0.88 | 0.86 |
| 2     | 0.96                                    | 0.93 | 0.90 | 0.95 | 0.91 | 0.89 | 0.92 | 0.89 | 0.87 | 0.89 | 0.87 | 0.85 | 0.86 | 0.85 | 0.83 | 0.82 |
| 3     | 0.91                                    | 0.87 | 0.83 | 0.90 | 0.86 | 0.83 | 0.87 | 0.84 | 0.81 | 0.85 | 0.82 | 0.80 | 0.83 | 0.81 | 0.79 | 0.78 |
| 4     | 0.86                                    | 0.82 | 0.78 | 0.85 | 0.81 | 0.78 | 0.83 | 0.80 | 0.77 | 0.82 | 0.79 | 0.76 | 0.80 | 0.77 | 0.75 | 0.74 |
| 5     | 0.82                                    | 0.77 | 0.74 | 0.81 | 0.77 | 0.74 | 0.80 | 0.76 | 0.73 | 0.78 | 0.75 | 0.72 | 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 | 0.69 | 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     | 0.72                                    | 0.67 | 0.64 | 0.71 | 0.67 | 0.64 | 0.70 | 0.66 | 0.63 | 0.69 | 0.66 | 0.63 | 0.69 | 0.65 | 0.63 | 0.62 |
| 9     | 0.69                                    | 0.64 | 0.61 | 0.68 | 0.64 | 0.61 | 0.68 | 0.64 | 0.61 | 0.67 | 0.63 | 0.60 | 0.66 | 0.63 | 0.60 | 0.59 |
| 10    | 0.66                                    | 0.61 | 0.58 | 0.66 | 0.61 | 0.58 | 0.65 | 0.61 | 0.58 | 0.64 | 0.61 | 0.58 | 0.64 | 0.60 | 0.58 | 0.57 |



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| Intensity data(cd) |         |         |         |         |         |         |         |        |        | Appendix Page: 15 Total:15 |  |
|--------------------|---------|---------|---------|---------|---------|---------|---------|--------|--------|----------------------------|--|
| C/γ(°)             | 0.0     | 5.0     | 10.0    | 15.0    | 20.0    | 25.0    | 30.0    | 35.0   | 40.0   |                            |  |
| 0.0                | 3913.96 | 3743.84 | 3343.58 | 2805.12 | 2124.63 | 1552.04 | 1124.25 | 514.23 | 67.61  |                            |  |
| 45.0               | 3914.51 | 3687.13 | 3264.84 | 2714.28 | 2055.81 | 1488.17 | 1040.02 | 411.27 | 42.39  |                            |  |
| 90.0               | 3896.89 | 3642.53 | 3179.51 | 2625.09 | 1991.94 | 1445.23 | 965.85  | 360.34 | 40.69  |                            |  |
| 135.0              | 3915.06 | 3724.01 | 3400.28 | 2857.98 | 2208.86 | 1605.44 | 1176.56 | 584.15 | 176.40 |                            |  |
| 180.0              | 3913.96 | 3733.93 | 3357.34 | 2885.51 | 2231.99 | 1617.01 | 1073.10 | 614.48 | 113.80 |                            |  |
| 225.0              | 3914.51 | 3805.50 | 3439.37 | 2935.06 | 2353.11 | 1704.00 | 1096.01 | 705.27 | 166.99 |                            |  |
| 270.0              | 3896.89 | 3855.60 | 3499.94 | 3044.62 | 2441.20 | 1784.38 | 1293.83 | 778.50 | 282.44 |                            |  |
| 315.0              | 3915.06 | 3755.95 | 3346.33 | 2798.52 | 2136.74 | 1547.64 | 1074.76 | 524.14 | 85.01  |                            |  |
| 360.0              | 3913.96 | 3743.84 | 3343.58 | 2805.12 | 2124.63 | 1552.04 | 1124.25 | 514.23 | 67.61  |                            |  |
| C/γ(°)             | 45.0    | 50.0    | 55.0    | 60.0    | 65.0    | 70.0    | 75.0    | 80.0   | 85.0   |                            |  |
| 0.0                | 14.87   | 12.33   | 11.62   | 11.18   | 10.85   | 10.68   | 10.52   | 10.41  | 10.41  |                            |  |
| 45.0               | 13.27   | 12.17   | 11.56   | 11.12   | 10.85   | 10.68   | 10.52   | 10.35  | 10.52  |                            |  |
| 90.0               | 13.05   | 12.06   | 11.51   | 11.12   | 10.79   | 10.68   | 10.52   | 10.41  | 11.34  |                            |  |
| 135.0              | 17.78   | 12.55   | 11.78   | 11.29   | 11.01   | 10.74   | 10.57   | 10.46  | 11.12  |                            |  |
| 180.0              | 18.06   | 12.61   | 11.78   | 11.23   | 10.90   | 10.68   | 10.46   | 10.35  | 10.30  |                            |  |
| 225.0              | 19.38   | 12.66   | 11.73   | 11.23   | 10.90   | 10.63   | 10.46   | 10.35  | 10.24  |                            |  |
| 270.0              | 21.42   | 12.94   | 11.89   | 11.34   | 10.96   | 10.74   | 10.52   | 10.41  | 10.30  |                            |  |
| 315.0              | 15.75   | 12.50   | 11.67   | 11.23   | 10.90   | 10.68   | 10.52   | 10.41  | 10.46  |                            |  |
| 360.0              | 14.87   | 12.33   | 11.62   | 11.18   | 10.85   | 10.68   | 10.52   | 10.41  | 10.41  |                            |  |
| C/γ(°)             | 90.0    |         |         |         |         |         |         |        |        |                            |  |
| 0.0                | 10.13   |         |         |         |         |         |         |        |        |                            |  |
| 45.0               | 10.13   |         |         |         |         |         |         |        |        |                            |  |
| 90.0               | 10.19   |         |         |         |         |         |         |        |        |                            |  |
| 135.0              | 10.19   |         |         |         |         |         |         |        |        |                            |  |
| 180.0              | 10.13   |         |         |         |         |         |         |        |        |                            |  |
| 225.0              | 10.13   |         |         |         |         |         |         |        |        |                            |  |
| 270.0              | 10.19   |         |         |         |         |         |         |        |        |                            |  |
| 315.0              | 10.19   |         |         |         |         |         |         |        |        |                            |  |
| 360.0              | 10.13   |         |         |         |         |         |         |        |        |                            |  |