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## Nata

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|                             |                     |
|-----------------------------|---------------------|
| LumCAT: 1689-M              |                     |
| Luminaire: 92.70.126.00     |                     |
| Report No: NATA0100         | Voltage(V): 36.2000 |
| Test No: GC2018082011       | Current(A): 0.4000  |
| LampCAT: LUMINUS CHM-9-AA10 | Power (W): 15.4800  |
| Lamp flux(lm): 1813.0       | PF: 0.0000          |
| Number of Lamps: 1          | Ballast type: DC    |
| Length(mm): 46              | Width(mm): 46       |
| Phm Type: C                 | Height(mm): 0       |

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## Photometric Results

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Lumens(lm): 1677.63  
Efficiency(%): 92.53%  
Lumens(lm)/Power(W): 108.84  
Central intensity(cd): 1478.540  
Maximum intensity(cd): 1478.540  
Angle of maximum intensity: C=0.0  $\gamma$ =0.0  
Beam Angle(50%Imax): [C0/180]Total=70.4  
[C90/270]Total=70.4  
Field angle(10%Imax): [C0/180]Total=94.6  
[C90/270]Total=94.6  
Maximum s/h(1/2): C0\_180=0.97 C90\_270=0.97  
Maximum s/h(1/4): C0\_180=1.04 C90\_270=1.04  
Up flux rate of lamp(%): 0.00%  
Down flux rate of lamp(%): 92.93%  
Up flux rate of LUM(%): - -  
Down flux rate of LUM(%): 100.00%  
CIE Type : Direct lighting  
Output flux ratio in  $\pi$  solid angle : 98.304%

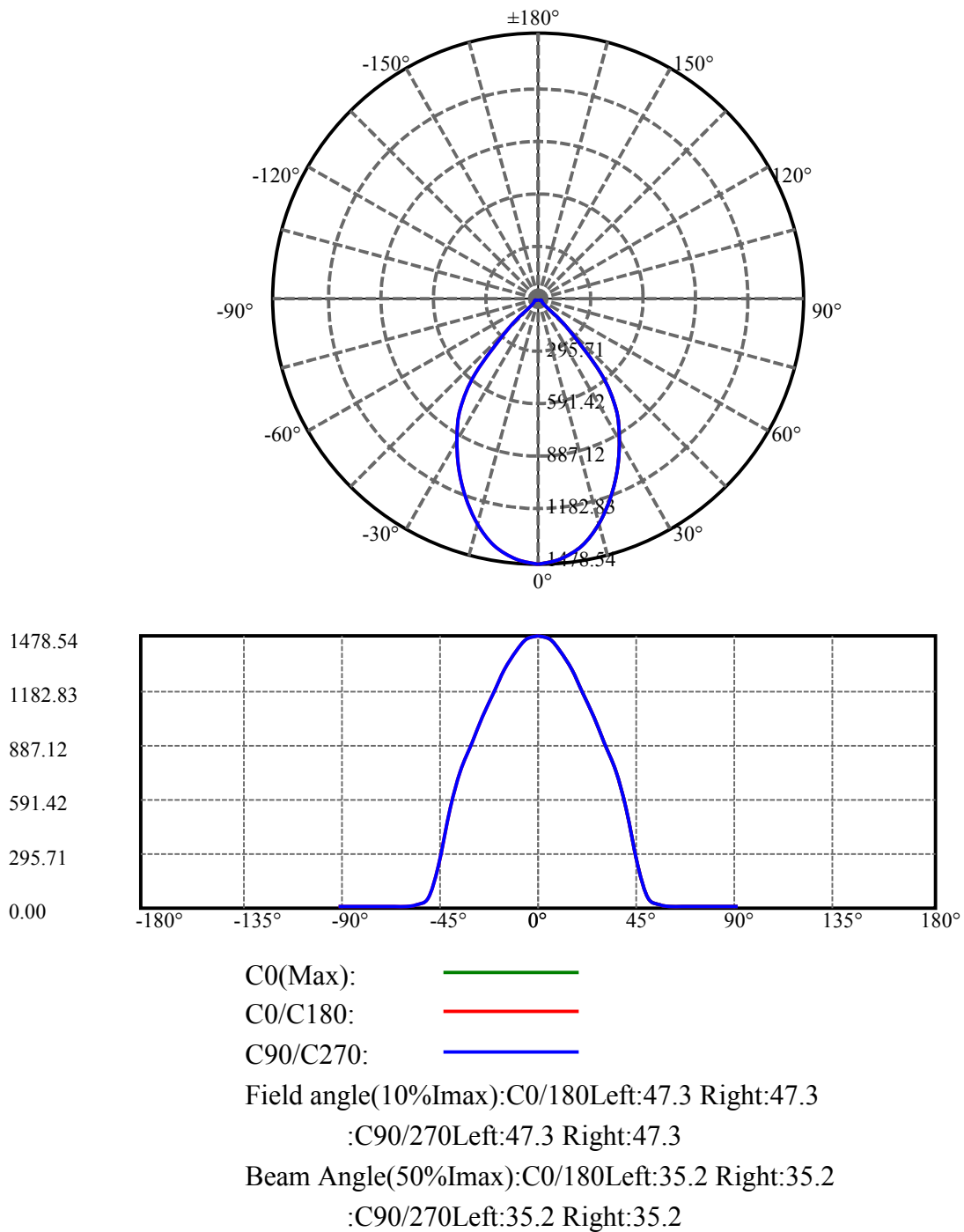
| $\gamma(^{\circ})$ | Average I(cd) | Zonal F(lm) | Sum F(lm) | Eff Flux(%) | Eff Sum(%) |
|--------------------|---------------|-------------|-----------|-------------|------------|
| 0.0                | 1478.540      | 8.842       | 8.842     | .488%       | .527%      |
| 5.0                | 1457.893      | 69.648      | 78.49     | 3.842%      | 4.679%     |
| 10.0               | 1392.996      | 132.590     | 211.08    | 7.313%      | 12.582%    |
| 15.0               | 1298.368      | 184.197     | 395.277   | 10.160%     | 23.562%    |
| 20.0               | 1175.385      | 220.354     | 615.632   | 12.154%     | 36.696%    |
| 25.0               | 1041.433      | 241.251     | 856.882   | 13.307%     | 51.077%    |
| 30.0               | 896.697       | 245.756     | 1102.639  | 13.555%     | 65.726%    |
| 35.0               | 748.313       | 235.269     | 1337.908  | 12.977%     | 79.750%    |
| 40.0               | 544.191       | 191.738     | 1529.646  | 10.576%     | 91.179%    |
| 45.0               | 228.993       | 88.756      | 1618.402  | 4.896%      | 96.469%    |
| 50.0               | 51.436        | 21.598      | 1640      | 1.191%      | 97.757%    |
| 55.0               | 22.050        | 9.901       | 1649.9    | .546%       | 98.347%    |
| 60.0               | 13.489        | 6.403       | 1656.303  | .353%       | 98.729%    |
| 65.0               | 9.594         | 4.766       | 1661.069  | .263%       | 99.013%    |
| 70.0               | 7.832         | 4.034       | 1665.103  | .223%       | 99.253%    |
| 75.0               | 6.978         | 3.695       | 1668.798  | .204%       | 99.473%    |
| 80.0               | 6.614         | 3.570       | 1672.368  | .197%       | 99.686%    |
| 85.0               | 6.448         | 3.521       | 1675.889  | .194%       | 99.896%    |
| 90.0               | 6.366         | 1.745       | 1677.634  | .096%       | 100.000%   |

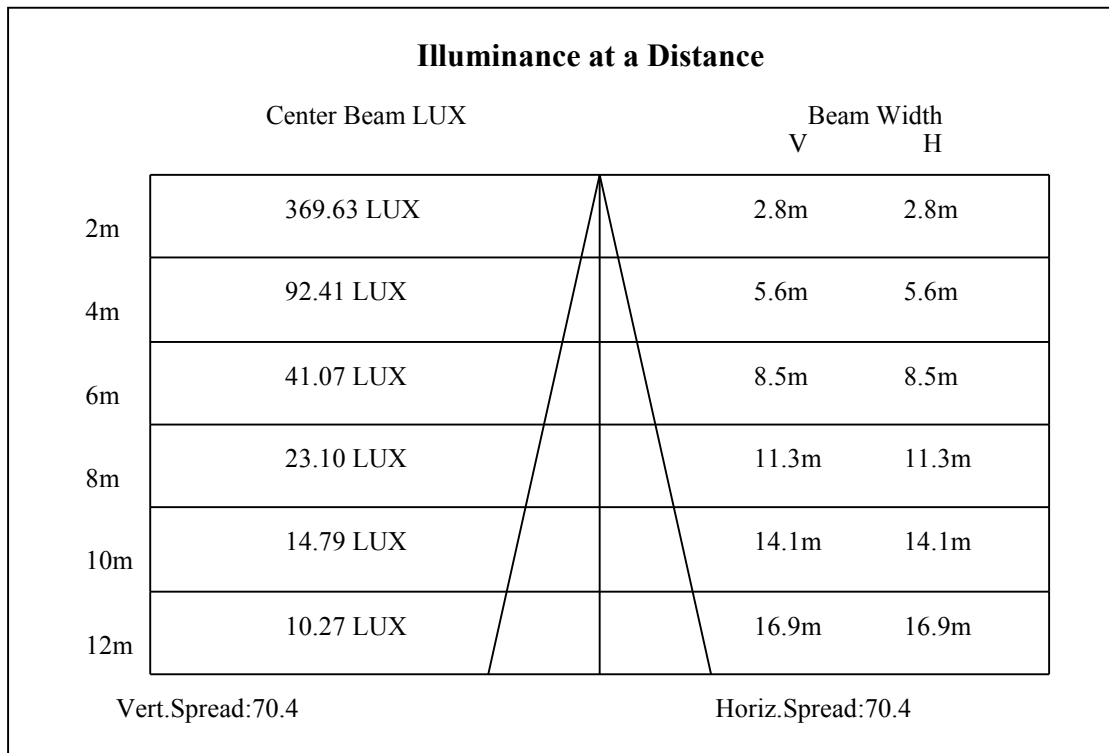
## ZONAL LUMEN SUMMARY

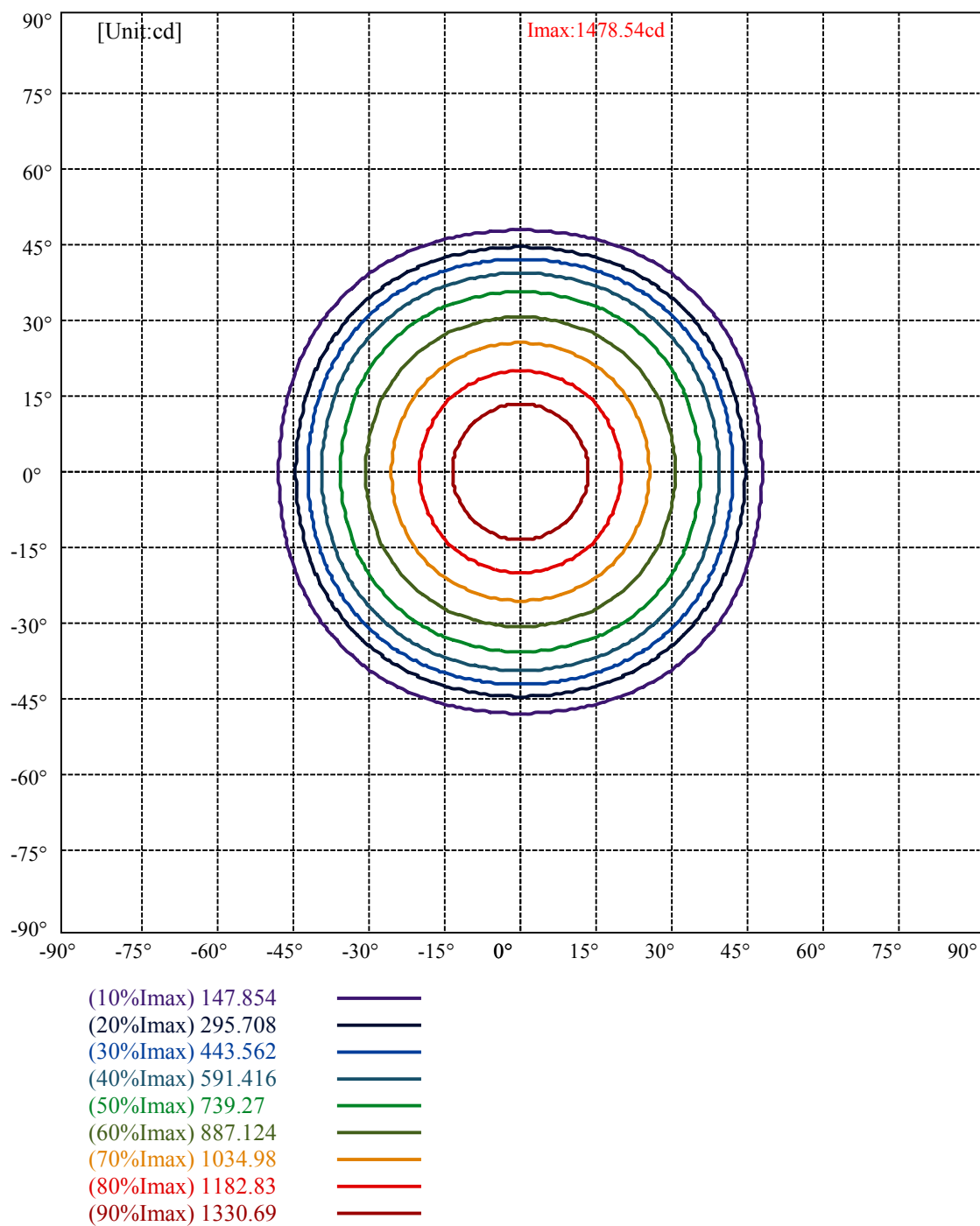
| Zone    | Lumens  | %Lamp  | %Fixt   |
|---------|---------|--------|---------|
| 0-30    | 1102.64 | 60.82% | 65.73%  |
| 0-40    | 1529.65 | 84.37% | 91.18%  |
| 0-60    | 1656.30 | 91.36% | 98.73%  |
| 0-90    | 1675.89 | 92.44% | 99.90%  |
| 0-120   | 1675.89 | 92.44% | 99.90%  |
| 0-180   | 1677.63 | 92.53% | 100.00% |
| 60-90   | 25.99   | 1.43%  | 1.55%   |
| 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%   |
| 0-35.11 | 1342.11 | 74.03% | 80.00%  |

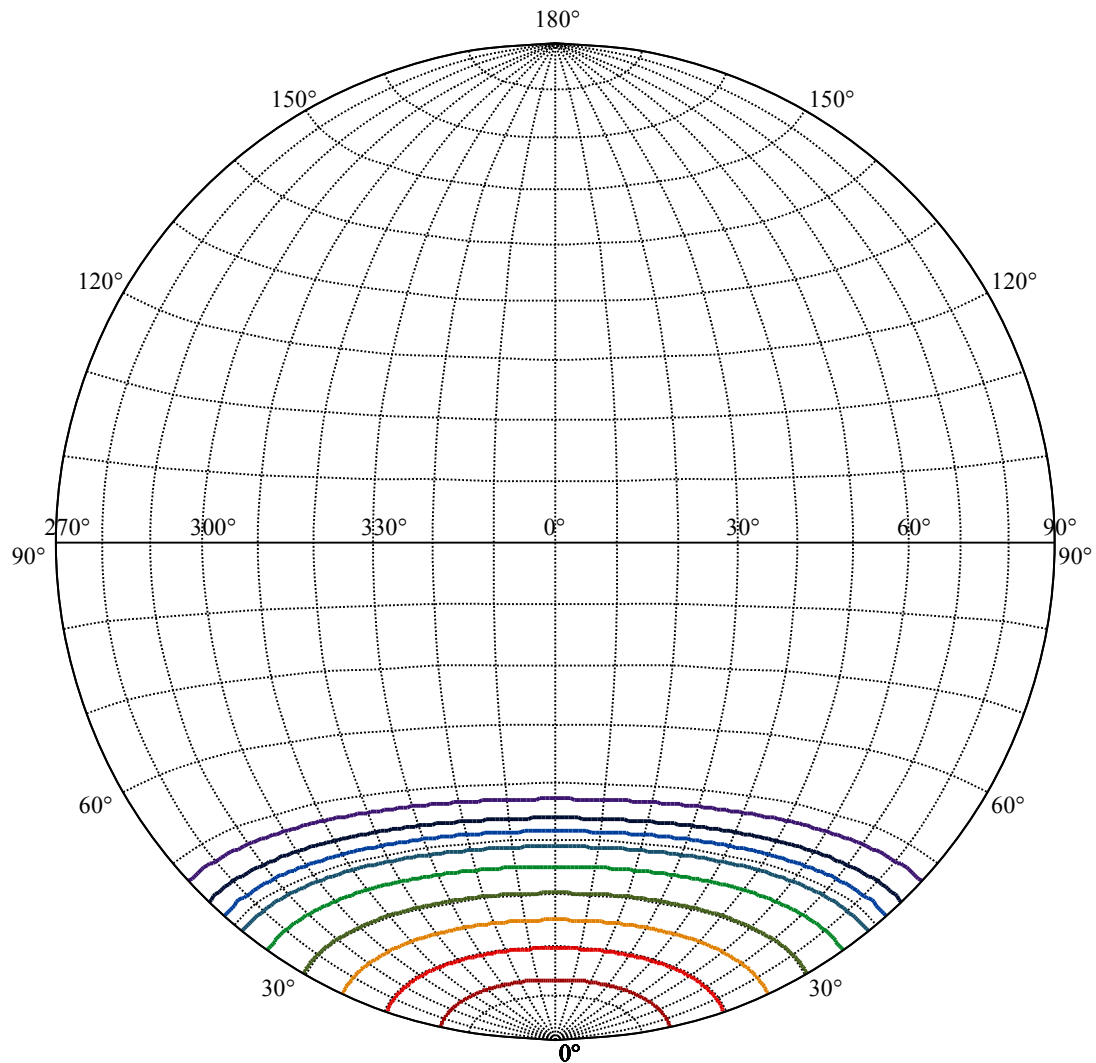
## ZONAL LUMEN SUMMARY

|         |        |
|---------|--------|
| 0-10    | 211.08 |
| 10-20   | 404.55 |
| 20-30   | 487.01 |
| 30-40   | 427.01 |
| 40-50   | 110.35 |
| 50-60   | 16.30  |
| 60-70   | 8.80   |
| 70-80   | 7.26   |
| 80-90   | 3.52   |
| 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

Imax:1478.54

(10%Imax) 147.854

(20%Imax) 295.708

(30%Imax) 443.562

(40%Imax) 591.416

(50%Imax) 739.27

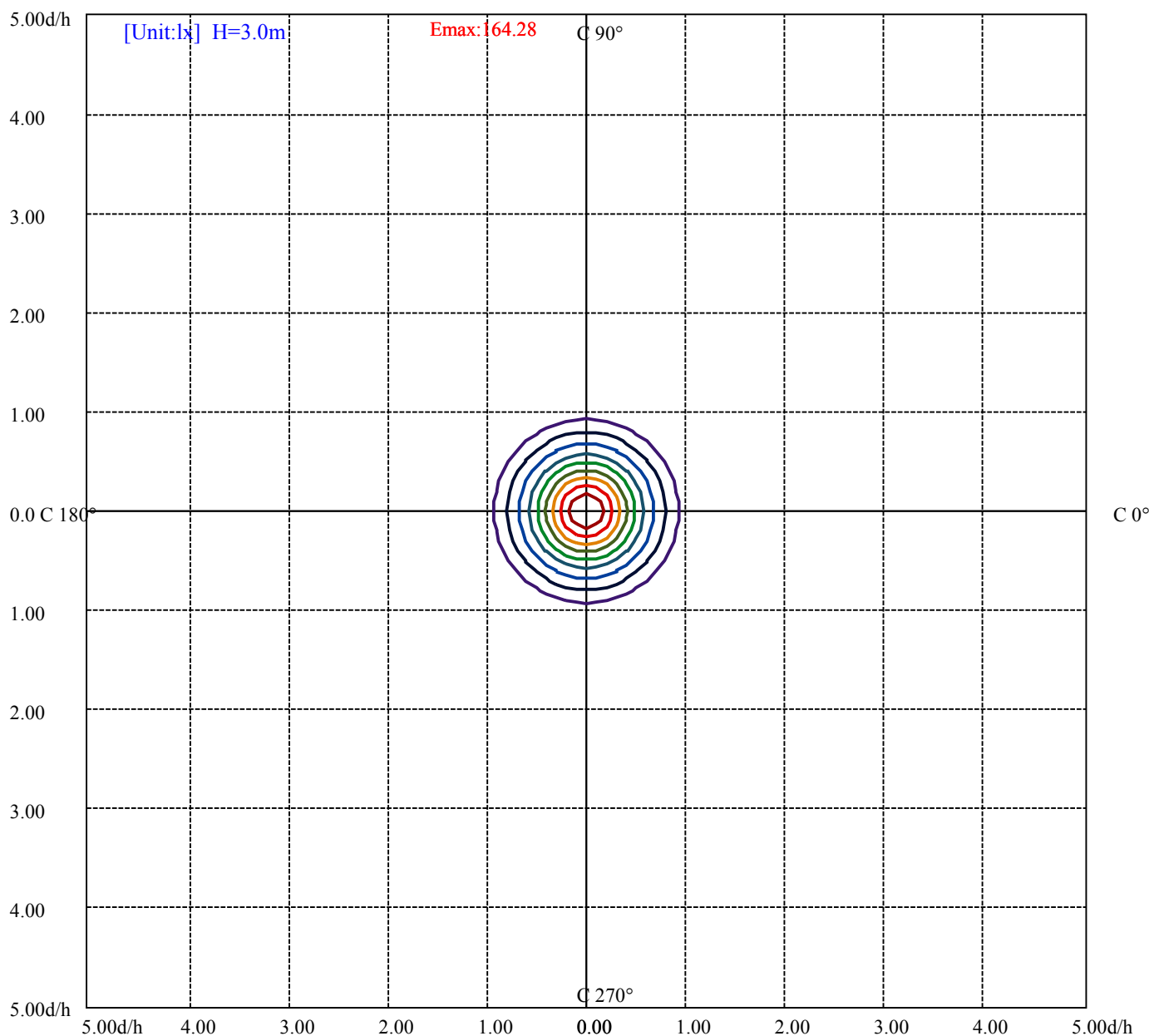
(60%Imax) 887.124

(70%Imax) 1034.98

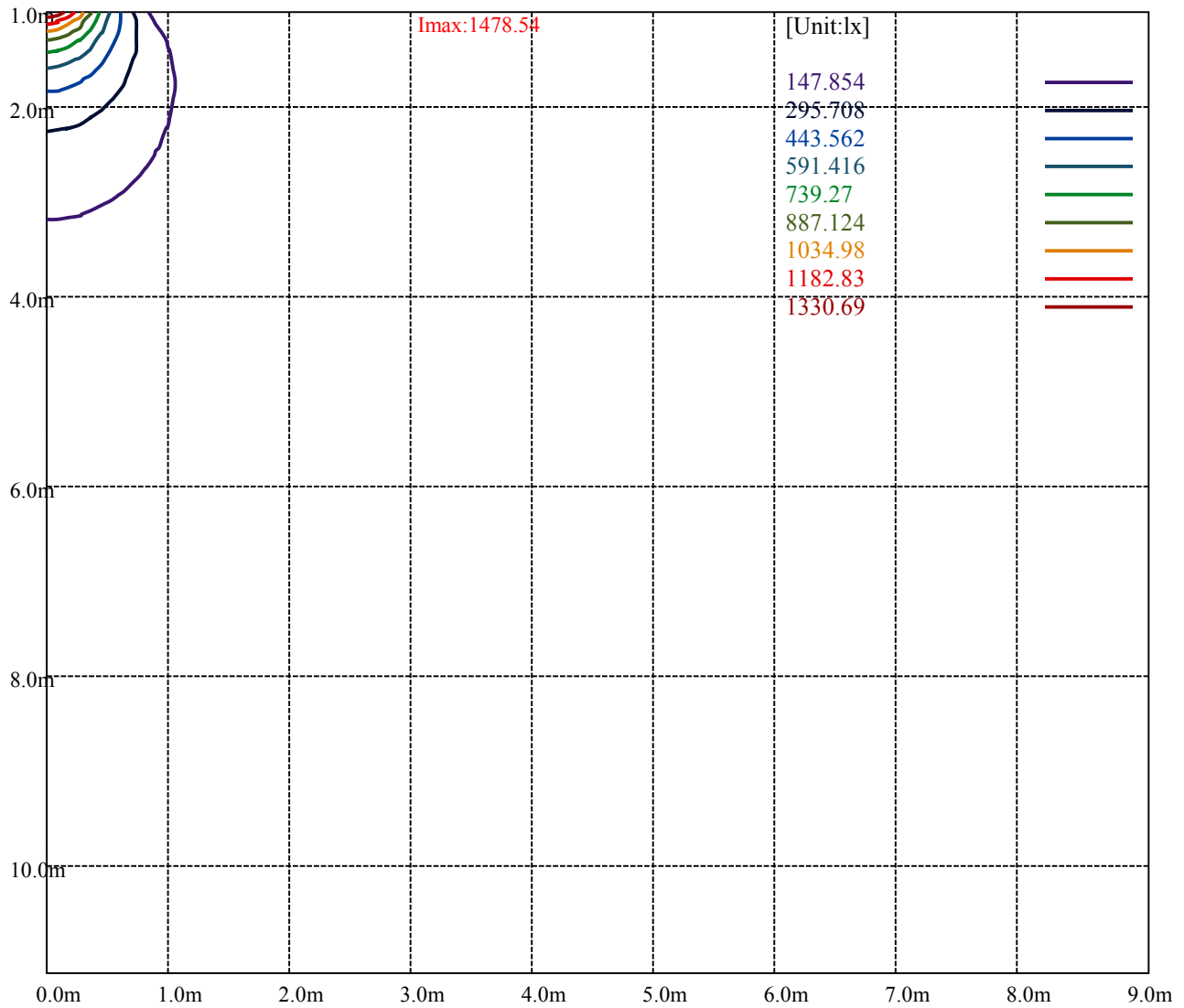
(80%Imax) 1182.83

(90%Imax) 1330.69





|                    |   |
|--------------------|---|
| (10%Emax) 16.42822 | — |
| (20%Emax) 32.85645 | — |
| (30%Emax) 49.28467 | — |
| (40%Emax) 65.71289 | — |
| (50%Emax) 82.141   | — |
| (60%Emax) 98.56922 | — |
| (70%Emax) 114.9978 | — |
| (80%Emax) 131.4256 | — |
| (90%Emax) 147.8544 | — |



Luminance Table

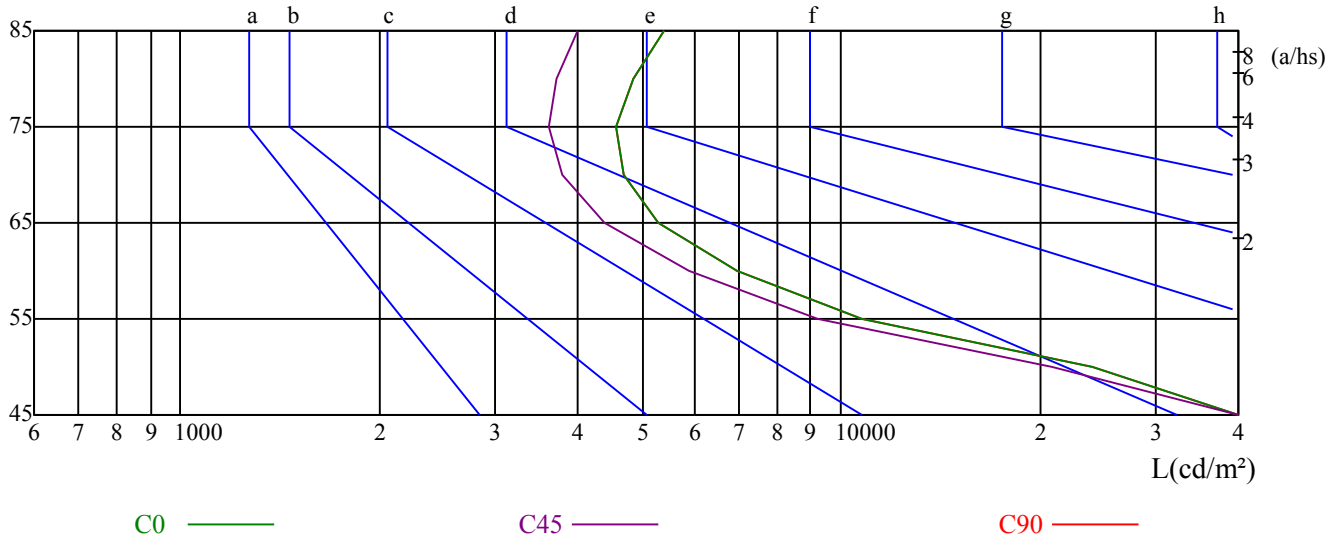
| $\gamma$ | 45     | 50    | 55    | 60   | 65   | 70   | 75   | 80   | 85   |
|----------|--------|-------|-------|------|------|------|------|------|------|
| C0       | 103531 | 24088 | 10795 | 6973 | 5296 | 4677 | 4575 | 4848 | 5407 |
| C45      | 91296  | 20939 | 9241  | 5871 | 4378 | 3786 | 3616 | 3722 | 4005 |
| C90      | 103531 | 24088 | 10795 | 6973 | 5296 | 4677 | 4575 | 4848 | 5407 |

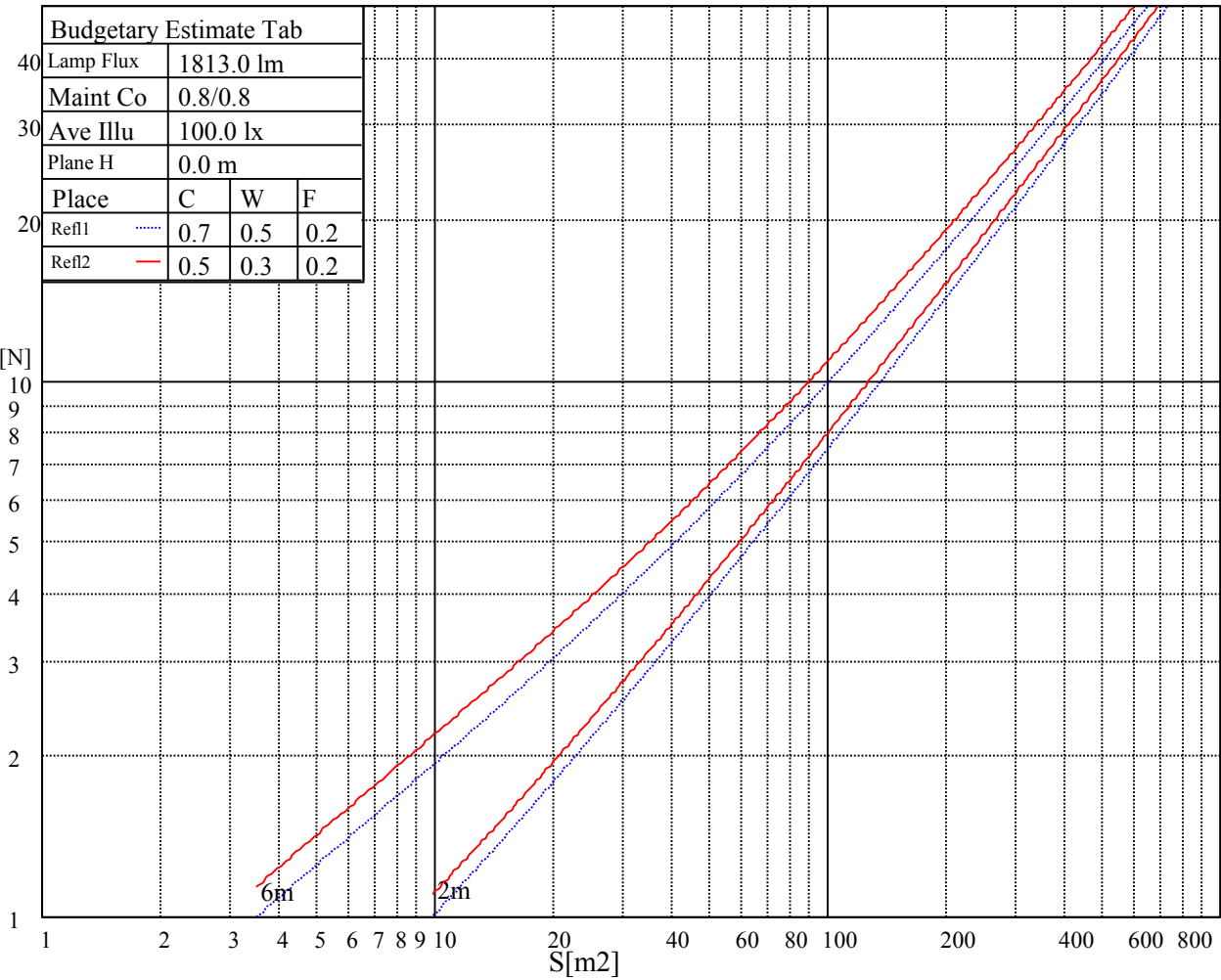
| L(Hor)(65) | L(Ver)(65) | L45(65) | L(Hor)(75) | L(Ver)(75) | L45(75) | L(Hor)(85) | L(Ver)(85) | L45(85) |
|------------|------------|---------|------------|------------|---------|------------|------------|---------|
| 10728      | 10728      | 10728   | 12742      | 12742      | 12742   | 34966      | 34966      | 34966   |

Glare Table

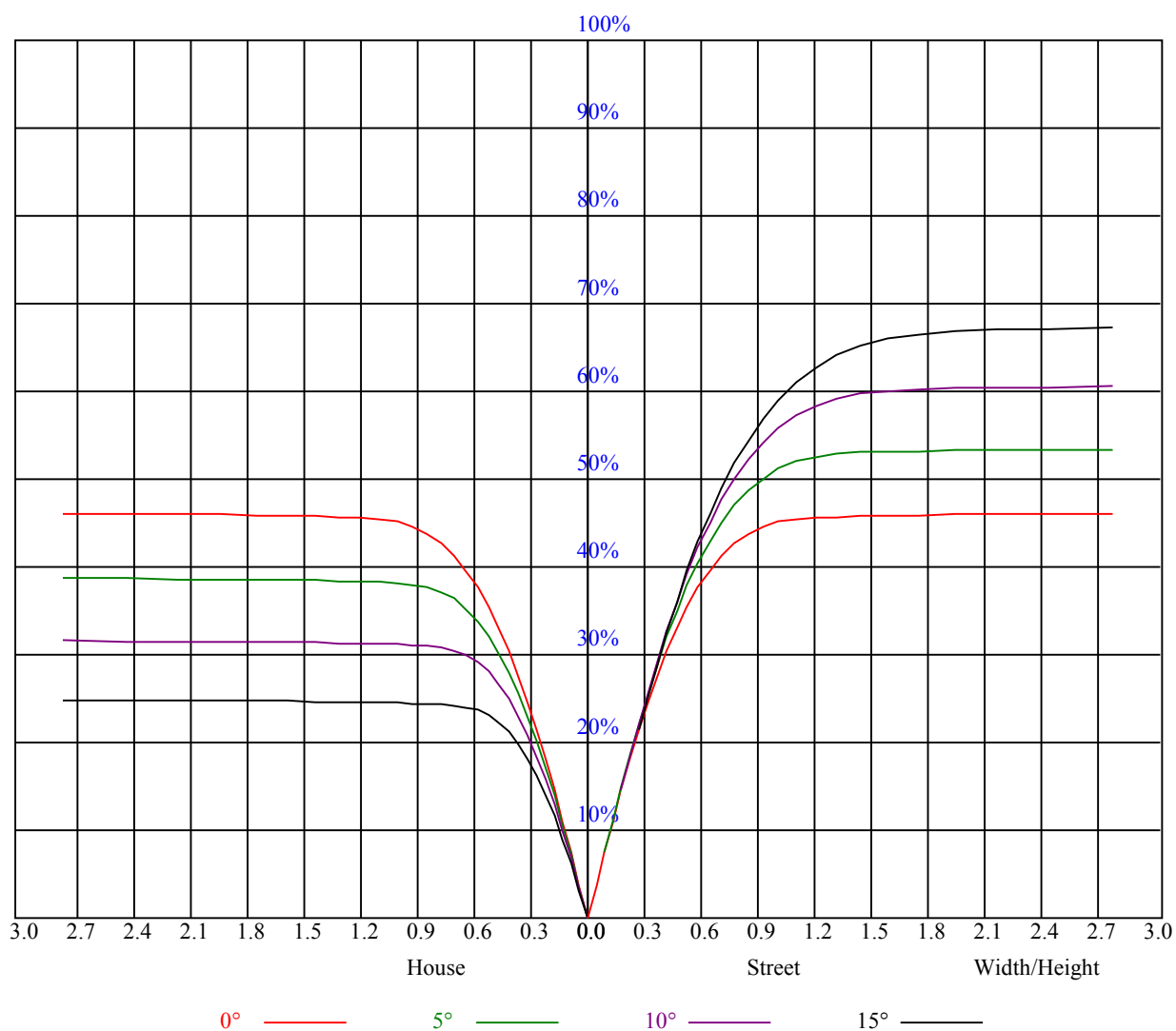
| Glare | Quality | Service Values Illuminance(lx) |      |      |            |            |            |            |            |
|-------|---------|--------------------------------|------|------|------------|------------|------------|------------|------------|
| 1.15  | A       | 2000                           | 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

 $\gamma(^{\circ})$ 



| 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     | 1.11                                    | 1.11 | 1.11 | 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     | 1.02                                    | 0.99 | 0.97 | 1.00 | 0.98 | 0.96 | 0.96 | 0.94 | 0.93 | 0.93 | 0.91 | 0.90 | 0.90 | 0.88 | 0.87 | 0.86 |
| 2     | 0.95                                    | 0.91 | 0.87 | 0.93 | 0.89 | 0.86 | 0.90 | 0.87 | 0.84 | 0.87 | 0.85 | 0.83 | 0.85 | 0.83 | 0.81 | 0.79 |
| 3     | 0.88                                    | 0.83 | 0.79 | 0.87 | 0.82 | 0.79 | 0.84 | 0.81 | 0.77 | 0.82 | 0.79 | 0.76 | 0.80 | 0.77 | 0.75 | 0.74 |
| 4     | 0.82                                    | 0.77 | 0.73 | 0.81 | 0.76 | 0.72 | 0.79 | 0.75 | 0.71 | 0.77 | 0.73 | 0.71 | 0.75 | 0.72 | 0.70 | 0.68 |
| 5     | 0.77                                    | 0.71 | 0.67 | 0.76 | 0.71 | 0.67 | 0.74 | 0.70 | 0.66 | 0.73 | 0.69 | 0.65 | 0.71 | 0.68 | 0.65 | 0.63 |
| 6     | 0.72                                    | 0.66 | 0.62 | 0.71 | 0.66 | 0.62 | 0.70 | 0.65 | 0.61 | 0.68 | 0.64 | 0.61 | 0.67 | 0.63 | 0.61 | 0.59 |
| 7     | 0.67                                    | 0.62 | 0.58 | 0.67 | 0.61 | 0.58 | 0.66 | 0.61 | 0.57 | 0.64 | 0.60 | 0.57 | 0.63 | 0.60 | 0.57 | 0.55 |
| 8     | 0.63                                    | 0.58 | 0.54 | 0.63 | 0.58 | 0.54 | 0.62 | 0.57 | 0.53 | 0.61 | 0.56 | 0.53 | 0.60 | 0.56 | 0.53 | 0.52 |
| 9     | 0.60                                    | 0.54 | 0.50 | 0.59 | 0.54 | 0.50 | 0.58 | 0.54 | 0.50 | 0.58 | 0.53 | 0.50 | 0.57 | 0.53 | 0.50 | 0.49 |
| 10    | 0.57                                    | 0.51 | 0.47 | 0.56 | 0.51 | 0.47 | 0.55 | 0.51 | 0.47 | 0.55 | 0.50 | 0.47 | 0.54 | 0.50 | 0.47 | 0.46 |



Nata 1689-M

| Intensity data(cd) |         |         |         |         |         |         |        |        |        | Appendix Page: 14 Total:14 |  |
|--------------------|---------|---------|---------|---------|---------|---------|--------|--------|--------|----------------------------|--|
| C/γ(°)             | 0.0     | 5.0     | 10.0    | 15.0    | 20.0    | 25.0    | 30.0   | 35.0   | 40.0   |                            |  |
| 0.0                | 1482.12 | 1472.76 | 1425.96 | 1324.11 | 1195.27 | 1069.20 | 919.44 | 768.59 | 598.46 |                            |  |
| 45.0               | 1476.06 | 1467.80 | 1420.46 | 1332.36 | 1198.58 | 1059.29 | 910.08 | 760.88 | 595.71 |                            |  |
| 90.0               | 1475.51 | 1460.10 | 1401.74 | 1310.34 | 1193.07 | 1044.64 | 892.19 | 738.80 | 553.65 |                            |  |
| 135.0              | 1480.47 | 1460.65 | 1398.98 | 1305.94 | 1191.97 | 1057.63 | 918.34 | 762.53 | 584.70 |                            |  |
| 180.0              | 1482.12 | 1447.43 | 1364.85 | 1273.45 | 1153.43 | 1013.97 | 875.56 | 719.31 | 485.27 |                            |  |
| 225.0              | 1476.06 | 1443.03 | 1363.75 | 1267.40 | 1155.08 | 1021.35 | 879.31 | 739.46 | 491.60 |                            |  |
| 270.0              | 1475.51 | 1451.29 | 1379.71 | 1292.72 | 1171.60 | 1043.87 | 899.62 | 764.18 | 542.31 |                            |  |
| 315.0              | 1480.47 | 1460.10 | 1388.52 | 1280.61 | 1144.07 | 1021.52 | 879.03 | 732.75 | 501.84 |                            |  |
| 360.0              | 1482.12 | 1472.76 | 1425.96 | 1324.11 | 1195.27 | 1069.20 | 919.44 | 768.59 | 598.46 |                            |  |
| C/γ(°)             | 45.0    | 50.0    | 55.0    | 60.0    | 65.0    | 70.0    | 75.0   | 80.0   | 85.0   |                            |  |
| 0.0                | 281.34  | 61.06   | 27.25   | 16.19   | 10.74   | 8.31    | 7.21   | 6.72   | 6.44   |                            |  |
| 45.0               | 281.34  | 64.86   | 28.41   | 16.96   | 11.23   | 8.59    | 7.16   | 6.61   | 6.39   |                            |  |
| 90.0               | 216.43  | 52.69   | 25.05   | 14.92   | 10.19   | 8.09    | 7.05   | 6.66   | 6.44   |                            |  |
| 135.0              | 287.39  | 55.44   | 22.52   | 13.98   | 9.80    | 7.93    | 6.99   | 6.61   | 6.44   |                            |  |
| 180.0              | 167.70  | 43.16   | 18.72   | 11.78   | 8.92    | 7.49    | 6.83   | 6.55   | 6.44   |                            |  |
| 225.0              | 151.07  | 41.73   | 17.29   | 11.01   | 8.42    | 7.27    | 6.72   | 6.44   | 6.39   |                            |  |
| 270.0              | 281.89  | 48.50   | 19.10   | 11.67   | 8.86    | 7.60    | 6.99   | 6.77   | 6.61   |                            |  |
| 315.0              | 164.78  | 44.05   | 18.06   | 11.40   | 8.59    | 7.38    | 6.88   | 6.55   | 6.44   |                            |  |
| 360.0              | 281.34  | 61.06   | 27.25   | 16.19   | 10.74   | 8.31    | 7.21   | 6.72   | 6.44   |                            |  |
| C/γ(°)             | 90.0    |         |         |         |         |         |        |        |        |                            |  |
| 0.0                | 6.44    |         |         |         |         |         |        |        |        |                            |  |
| 45.0               | 6.33    |         |         |         |         |         |        |        |        |                            |  |
| 90.0               | 6.33    |         |         |         |         |         |        |        |        |                            |  |
| 135.0              | 6.39    |         |         |         |         |         |        |        |        |                            |  |
| 180.0              | 6.39    |         |         |         |         |         |        |        |        |                            |  |
| 225.0              | 6.33    |         |         |         |         |         |        |        |        |                            |  |
| 270.0              | 6.33    |         |         |         |         |         |        |        |        |                            |  |
| 315.0              | 6.39    |         |         |         |         |         |        |        |        |                            |  |
| 360.0              | 6.44    |         |         |         |         |         |        |        |        |                            |  |