

Light efficiency:

80 Lumen/Watt

Output: 1689 lm

Light quality:

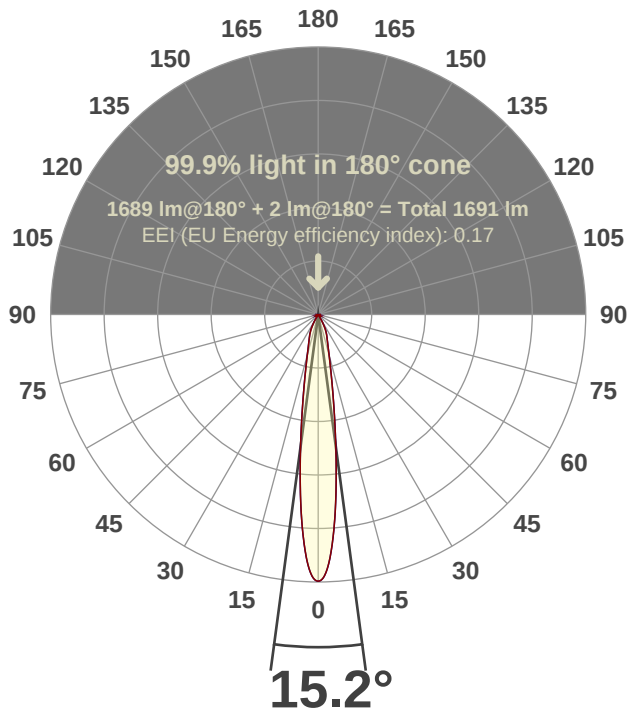
CRI: 92.7

Peak: 12169 cd

Power: 21.1 W



Beam angle



Test number:

CR4D-R-OR-C20-30k-15 (GRO-CZ20-SP-RD)

Luminaire Model:

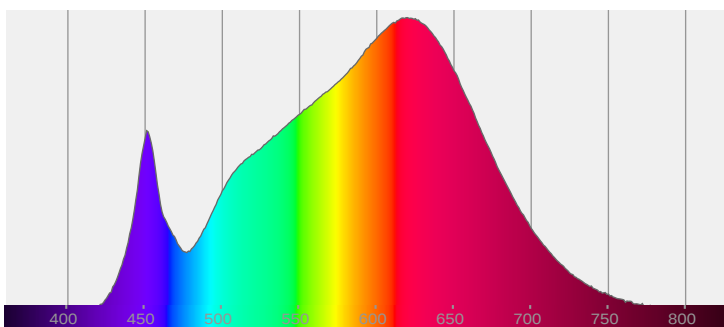
Core 4" Round Open Regress C20 30K 15°

Date and time:

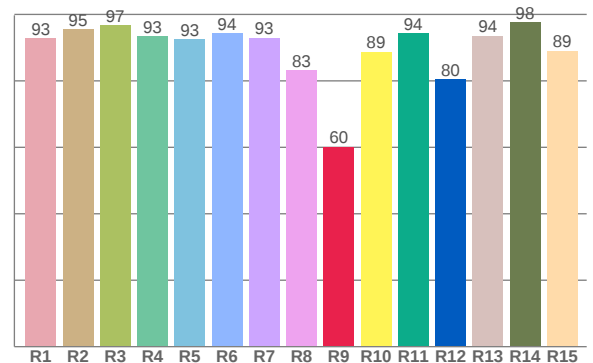
6/14/2017 4:32:19 PM

LUM: 1689

Spectra



CRI: 92.7 (R1-R8)



Color parameters

|  | Color rendering index | Red component | Color fidelity      | Color gamut         | Color quality scale | Color coordinate cie 1931 | Color coordinate cie 1931 | Color coordinate | Color coordinate | Color deviation from black body |
|--|-----------------------|---------------|---------------------|---------------------|---------------------|---------------------------|---------------------------|------------------|------------------|---------------------------------|
|  | CRI                   | CRI R9        | TM30 R <sub>f</sub> | TM30 R <sub>g</sub> | CQS                 | x                         | y                         | u                | v                | Δuv                             |
|  | 92.7                  | 60.1          | 91.8                | 100.2               | 91.0                | 0.428                     | 0.400                     | 0.246            | 0.346            | -0.0002                         |

**$R_f$  91.8**

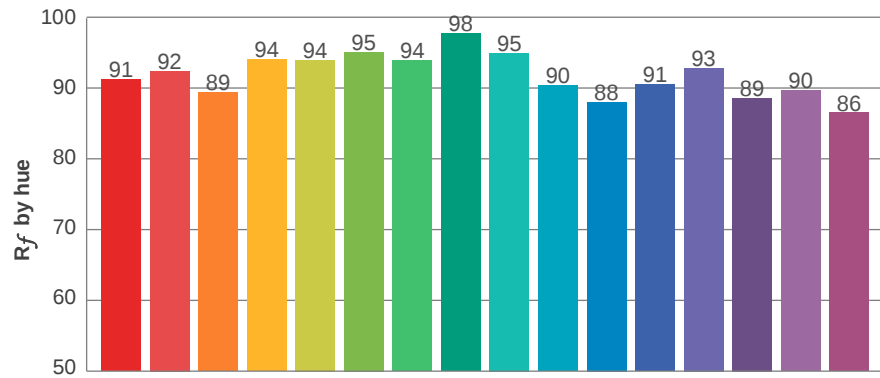
Fidelity index  $R_f$

**$R_g$  100.2**

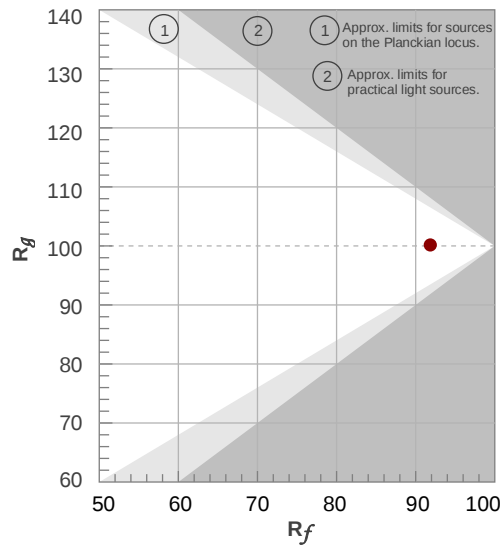
Gammut index  $R_g$

TM30: 91.8

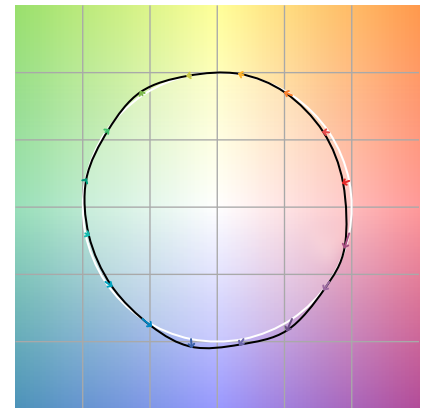
TM-30Color



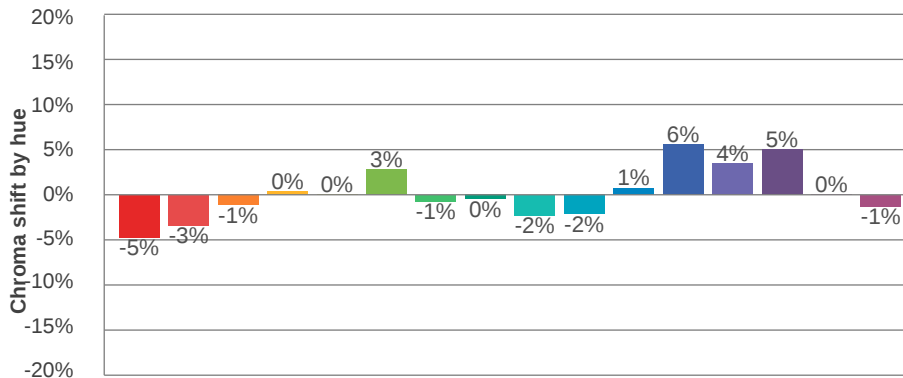
| Hue Bin | $R_f$ | Graphic shifts (%) |      |
|---------|-------|--------------------|------|
|         |       | Chroma             | Hue  |
| 1       | 91    | -5%                | -1%  |
| 2       | 92    | -3%                | 3%   |
| 3       | 89    | -1%                | 5%   |
| 4       | 94    | 0%                 | 3%   |
| 5       | 94    | 0%                 | 3%   |
| 6       | 95    | 3%                 | 0%   |
| 7       | 94    | -1%                | -3%  |
| 8       | 98    | 0%                 | -1%  |
| 9       | 95    | -2%                | 2%   |
| 10      | 90    | -2%                | 5%   |
| 11      | 88    | 1%                 | 8%   |
| 12      | 91    | 6%                 | 2%   |
| 13      | 93    | 4%                 | -3%  |
| 14      | 89    | 5%                 | -8%  |
| 15      | 90    | 0%                 | -7%  |
| 16      | 86    | -1%                | -11% |



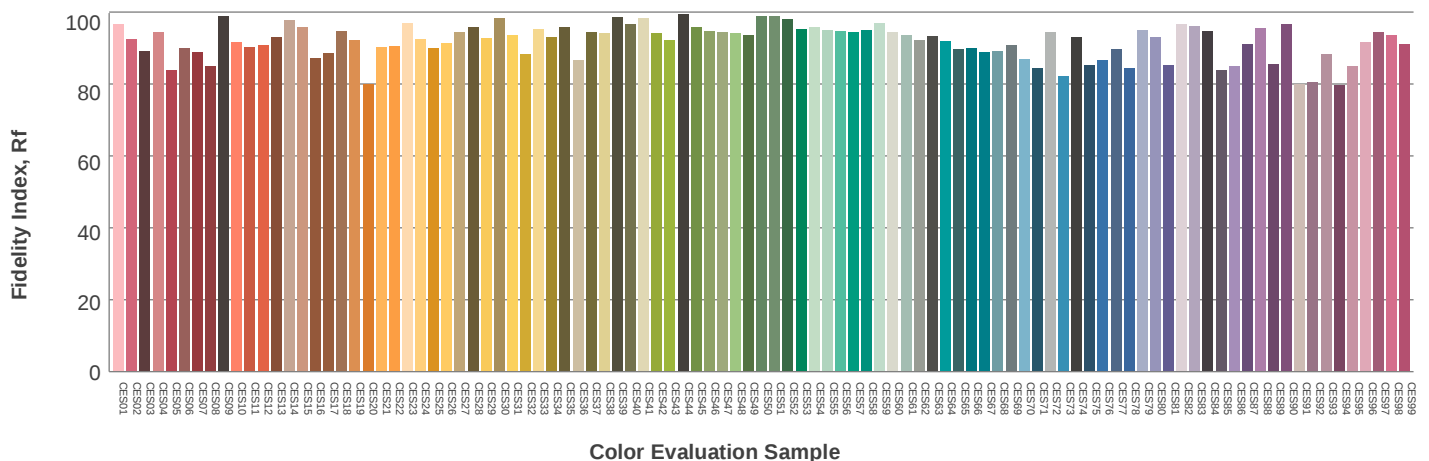
Color vector graphics



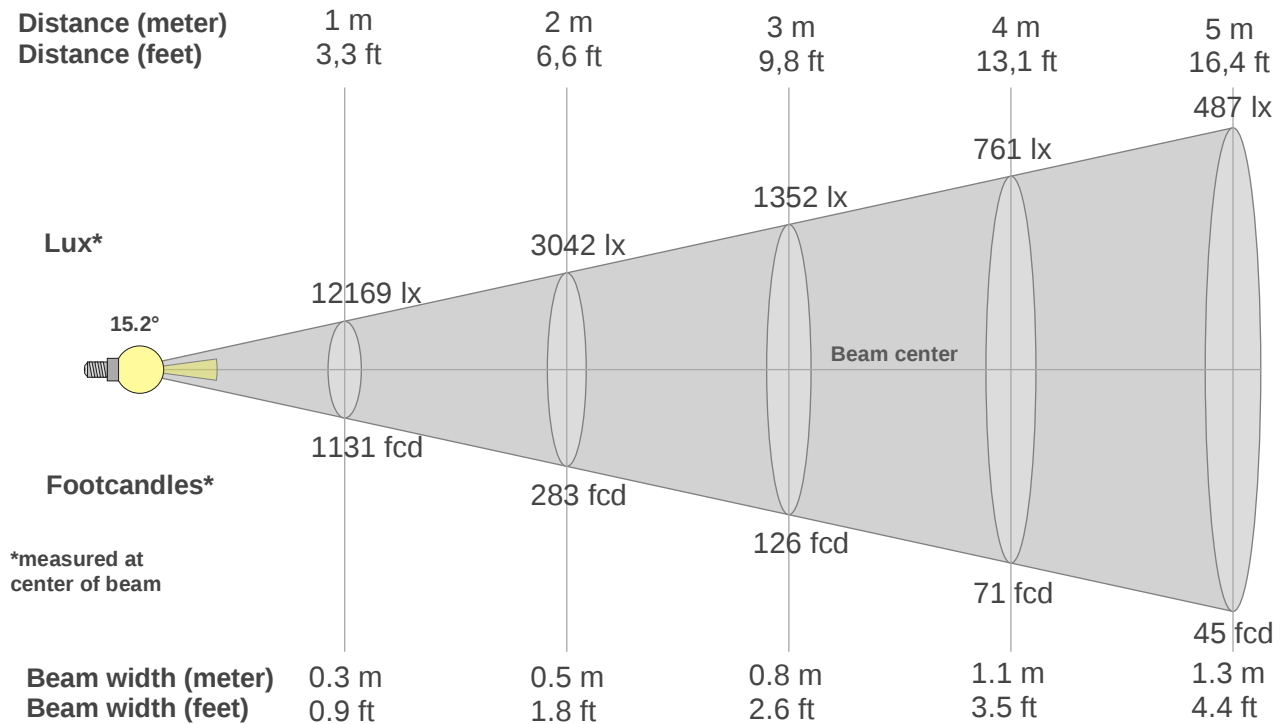
Color distortion



Hue bin



## Beam details



### Beam intensities from 1-20m

| 1m        | 2m       | 3m       | 4m      | 5m      | 6m      | 7m      | 8m      | 9m     | 10m     | 11m    | 12m    | 13m    | 14m    | 15m    | 16m    | 17m    | 18m    | 19m    | 20m    |
|-----------|----------|----------|---------|---------|---------|---------|---------|--------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 3.3ft     | 6.6ft    | 9.8ft    | 13.1ft  | 16.4ft  | 19.7ft  | 23ft    | 26.2ft  | 29.5ft | 32.8ft  | 36.1ft | 39.4ft | 42.7ft | 45.9ft | 49.2ft | 52.5ft | 55.8ft | 59.1ft | 62.3ft | 65.6ft |
| 12169lx   | 3042lx   | 1352lx   | 761lx   | 487lx   | 338lx   | 248lx   | 190lx   | 150lx  | 122lx   | 101lx  | 85lx   | 72lx   | 62lx   | 54lx   | 48lx   | 42lx   | 38lx   | 34lx   | 30lx   |
| 1130.6fcd | 282.6fcd | 125.6fcd | 70.7fcd | 45.2fcd | 31.4fcd | 23.1fcd | 17.7fcd | 14fcd  | 11.3fcd | 9.3fcd | 7.9fcd | 6.7fcd | 5.8fcd | 5fcd   | 4.4fcd | 3.9fcd | 3.5fcd | 3.1fcd | 2.8fcd |

### Intensities in 0° c-plane

| 0°    | 1°    | 2°    | 3°    | 4°    | 5°   | 6°   | 7°   | 8°   | 9°   | 10°  | 11°  | 12°  | 13°  | 14°  | 15°  | 16°  | 17°  | 18°  | 19°  |
|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 12.2K | 12.0K | 11.6K | 10.9K | 10.0K | 9.0K | 7.8K | 6.7K | 5.7K | 4.8K | 4.0K | 3.4K | 2.9K | 2.5K | 2.2K | 1.9K | 1.7K | 1.6K | 1.4K | 1.3K |
| 100%  | 99%   | 96%   | 90%   | 82%   | 74%  | 64%  | 55%  | 47%  | 39%  | 33%  | 28%  | 24%  | 21%  | 18%  | 16%  | 14%  | 13%  | 12%  | 11%  |

### Intensities in 90° c-plane

| 0°    | 1°    | 2°    | 3°    | 4°    | 5°   | 6°   | 7°   | 8°   | 9°   | 10°  | 11°  | 12°  | 13°  | 14°  | 15°  | 16°  | 17°  | 18°  | 19°  |
|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 12.2K | 12.0K | 11.6K | 10.9K | 10.0K | 9.0K | 7.8K | 6.7K | 5.7K | 4.8K | 4.0K | 3.4K | 2.9K | 2.5K | 2.2K | 1.9K | 1.7K | 1.6K | 1.4K | 1.3K |
| 100%  | 99%   | 96%   | 90%   | 82%   | 74%  | 64%  | 55%  | 47%  | 39%  | 33%  | 28%  | 24%  | 21%  | 18%  | 16%  | 14%  | 13%  | 12%  | 11%  |

### Intensities in 180° c-plane

| 0°    | 1°    | 2°    | 3°    | 4°    | 5°   | 6°   | 7°   | 8°   | 9°   | 10°  | 11°  | 12°  | 13°  | 14°  | 15°  | 16°  | 17°  | 18°  | 19°  |
|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 12.2K | 12.0K | 11.6K | 10.9K | 10.0K | 9.0K | 7.8K | 6.7K | 5.7K | 4.8K | 4.0K | 3.4K | 2.9K | 2.5K | 2.2K | 1.9K | 1.7K | 1.6K | 1.4K | 1.3K |
| 100%  | 99%   | 96%   | 90%   | 82%   | 74%  | 64%  | 55%  | 47%  | 39%  | 33%  | 28%  | 24%  | 21%  | 18%  | 16%  | 14%  | 13%  | 12%  | 11%  |

### Intensities in 270° c-plane

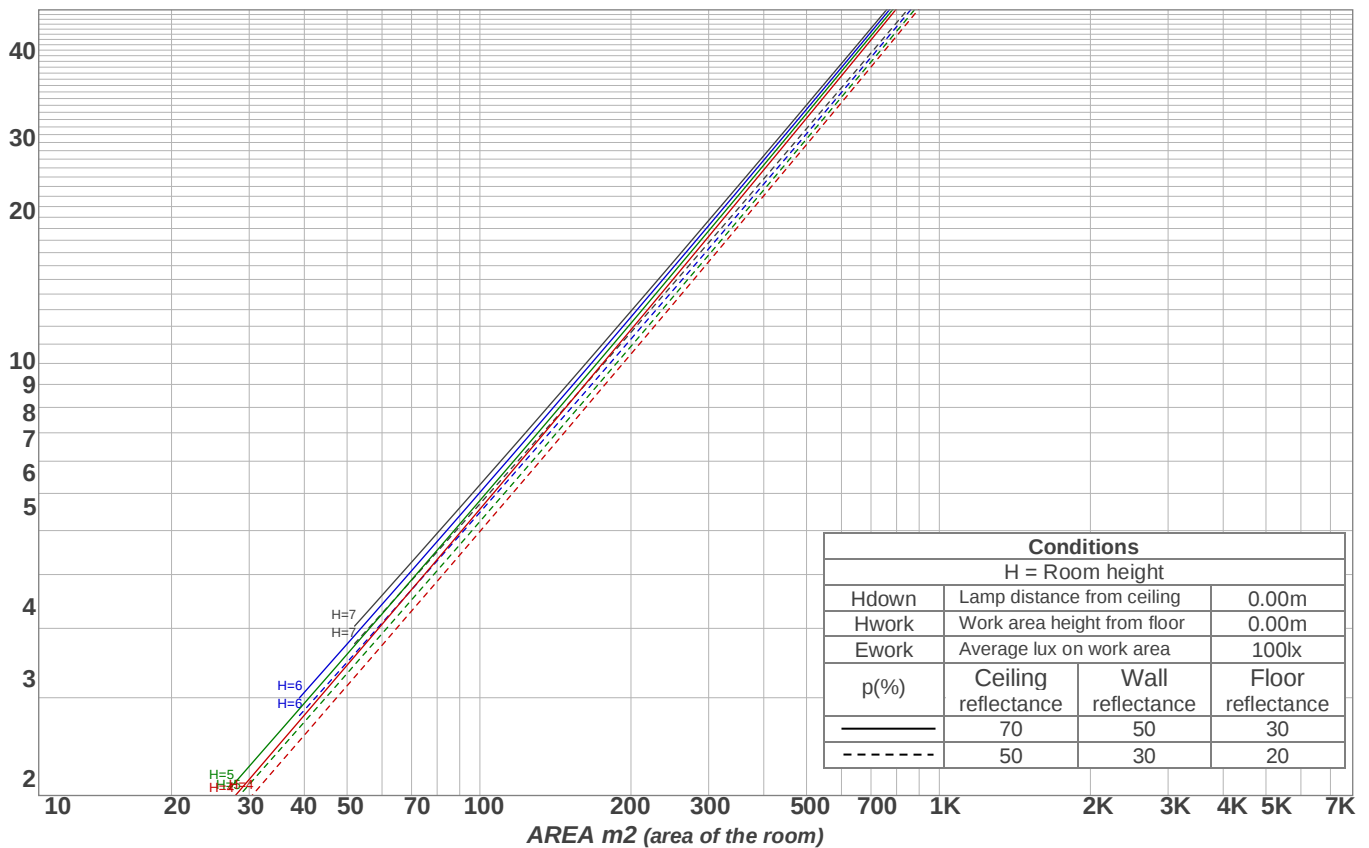
| 0°    | 1°    | 2°    | 3°    | 4°    | 5°   | 6°   | 7°   | 8°   | 9°   | 10°  | 11°  | 12°  | 13°  | 14°  | 15°  | 16°  | 17°  | 18°  | 19°  |
|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 12.2K | 12.0K | 11.6K | 10.9K | 10.0K | 9.0K | 7.8K | 6.7K | 5.7K | 4.8K | 4.0K | 3.4K | 2.9K | 2.5K | 2.2K | 1.9K | 1.7K | 1.6K | 1.4K | 1.3K |
| 100%  | 99%   | 96%   | 90%   | 82%   | 74%  | 64%  | 55%  | 47%  | 39%  | 33%  | 28%  | 24%  | 21%  | 18%  | 16%  | 14%  | 13%  | 12%  | 11%  |

| Beam angle 50% | Field angle 10% | Cutoff angle 2,5% | Intensity ratio in 120° cone | Intensity ratio in 90° cone |
|----------------|-----------------|-------------------|------------------------------|-----------------------------|
| 15.2°          | 39.9°           | 61.6°             | 99.6%                        | 99.4%                       |

## Light planning

### Luminaire budgetary diagram

LAMPS (number of lamps)  
50



### Luminaire budgetary diagram

AREA m2 (area of the room)

### Coefficients of Utilization

| Ceiling reflectance | 80                                                                                                       |     |     |     | 70  |     |     |     | 50  |     |     | 30  |     |     | 10  |     |     | 0   |
|---------------------|----------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Wall reflectance    | 70                                                                                                       | 50  | 30  | 10  | 70  | 50  | 30  | 10  | 50  | 30  | 10  | 50  | 30  | 10  | 50  | 30  | 10  | 0   |
| Floor reflectance   | 20                                                                                                       | 20  | 20  | 20  | 20  | 20  | 20  | 20  | 20  | 20  | 20  | 20  | 20  | 20  | 20  | 20  | 20  | 0   |
| RCR                 | (RCR: Room Cavity Ratio) Room Values are expressed as percentage of Lumens delivered to the task surface |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 0                   | 119                                                                                                      | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 |
| 1                   | 115                                                                                                      | 113 | 111 | 109 | 113 | 111 | 109 | 108 | 107 | 106 | 104 | 103 | 102 | 101 | 100 | 99  | 98  | 97  |
| 2                   | 111                                                                                                      | 108 | 105 | 102 | 109 | 106 | 103 | 101 | 103 | 101 | 99  | 100 | 98  | 97  | 97  | 96  | 95  | 93  |
| 3                   | 108                                                                                                      | 103 | 100 | 97  | 106 | 102 | 99  | 96  | 99  | 97  | 95  | 97  | 95  | 93  | 95  | 93  | 92  | 90  |
| 4                   | 105                                                                                                      | 99  | 95  | 92  | 103 | 98  | 95  | 92  | 96  | 93  | 91  | 94  | 92  | 90  | 93  | 91  | 89  | 88  |
| 5                   | 102                                                                                                      | 96  | 92  | 89  | 100 | 95  | 91  | 88  | 93  | 90  | 88  | 92  | 89  | 87  | 90  | 88  | 86  | 85  |
| 6                   | 99                                                                                                       | 93  | 88  | 85  | 97  | 92  | 88  | 85  | 91  | 87  | 85  | 89  | 86  | 84  | 88  | 86  | 84  | 83  |
| 7                   | 96                                                                                                       | 90  | 86  | 83  | 95  | 89  | 85  | 82  | 88  | 85  | 82  | 87  | 84  | 82  | 86  | 83  | 81  | 80  |
| 8                   | 93                                                                                                       | 87  | 83  | 80  | 92  | 86  | 83  | 80  | 86  | 82  | 80  | 85  | 82  | 79  | 84  | 81  | 79  | 78  |
| 9                   | 91                                                                                                       | 84  | 80  | 78  | 90  | 84  | 80  | 78  | 83  | 80  | 77  | 83  | 79  | 77  | 82  | 79  | 77  | 76  |
| 10                  | 89                                                                                                       | 82  | 78  | 76  | 88  | 82  | 78  | 76  | 81  | 78  | 75  | 81  | 77  | 75  | 80  | 77  | 75  | 74  |

### Zonal Lumen Summary

| 0°-10°   | 10°-20°   | 20°-30°   | 30°-40°   | 40°-50°   | 50°-60°   | 60°-70°   | 70°-80°   | 80°-90°   |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 683 lm   | 574 lm    | 365 lm    | 57.0 lm   | 3.74 lm   | 2.53 lm   | 1.46 lm   | 1.47 lm   | 1.28 lm   |
| 90°-100° | 100°-110° | 110°-120° | 120°-130° | 130°-140° | 140°-150° | 150°-160° | 160°-170° | 170°-180° |
| 0.000 lm | 0.000 lm  | 0.000 lm  | 0.000 lm  | 0.000 lm  | 0.000 lm  | 0.000 lm  | 0.000 lm  | 0.000 lm  |

## UGR

|                                                                  |     |                                                   |      |      |      |      |                                         |      |      |      |      |
|------------------------------------------------------------------|-----|---------------------------------------------------|------|------|------|------|-----------------------------------------|------|------|------|------|
| p Ceiling                                                        |     | 70                                                | 70   | 50   | 50   | 30   | 70                                      | 70   | 50   | 50   | 30   |
| p Walls                                                          |     | 50                                                | 30   | 50   | 30   | 30   | 50                                      | 30   | 50   | 30   | 30   |
| p Floor                                                          |     | 20                                                | 20   | 20   | 20   | 20   | 20                                      | 20   | 20   | 20   | 20   |
| Room size<br>X Y                                                 |     | Viewing direction at right angles to<br>lamp axis |      |      |      |      | Viewing direction parallel to lamp axis |      |      |      |      |
| 2H                                                               | 2H  | 21.2                                              | 21.6 | 21.3 | 21.8 | 22.0 | 21.2                                    | 21.6 | 21.3 | 21.8 | 22.0 |
|                                                                  | 3H  | 20.9                                              | 21.5 | 21.3 | 21.7 | 21.9 | 20.9                                    | 21.5 | 21.3 | 21.7 | 21.9 |
|                                                                  | 4H  | 20.9                                              | 21.5 | 21.3 | 21.7 | 21.9 | 20.9                                    | 21.5 | 21.3 | 21.7 | 21.9 |
|                                                                  | 6H  | 21.1                                              | 21.5 | 21.4 | 21.8 | 22.1 | 21.1                                    | 21.5 | 21.4 | 21.8 | 22.1 |
|                                                                  | 8H  | 21.1                                              | 21.5 | 21.4 | 21.9 | 22.2 | 21.1                                    | 21.5 | 21.4 | 21.9 | 22.2 |
|                                                                  | 12H | 21.2                                              | 21.6 | 21.6 | 22.0 | 22.4 | 21.2                                    | 21.6 | 21.6 | 22.0 | 22.4 |
| 4H                                                               | 2H  | 20.8                                              | 21.4 | 21.2 | 21.6 | 21.8 | 20.8                                    | 21.4 | 21.2 | 21.6 | 21.8 |
|                                                                  | 3H  | 20.8                                              | 21.2 | 21.2 | 21.6 | 22.0 | 20.8                                    | 21.2 | 21.2 | 21.6 | 22.0 |
|                                                                  | 4H  | 20.8                                              | 21.2 | 21.2 | 21.6 | 22.1 | 20.8                                    | 21.2 | 21.2 | 21.6 | 22.1 |
|                                                                  | 6H  | 20.9                                              | 21.4 | 21.4 | 21.7 | 22.1 | 20.9                                    | 21.4 | 21.4 | 21.7 | 22.1 |
|                                                                  | 8H  | 21.1                                              | 21.5 | 21.6 | 21.8 | 22.2 | 21.1                                    | 21.5 | 21.6 | 21.8 | 22.2 |
|                                                                  | 12H | 21.3                                              | 21.6 | 21.8 | 22.0 | 22.4 | 21.3                                    | 21.6 | 21.8 | 22.0 | 22.4 |
| 8H                                                               | 4H  | 20.7                                              | 21.1 | 21.2 | 21.5 | 21.8 | 20.7                                    | 21.1 | 21.2 | 21.5 | 21.8 |
|                                                                  | 6H  | 21.0                                              | 21.3 | 21.5 | 21.7 | 22.3 | 21.0                                    | 21.3 | 21.5 | 21.7 | 22.3 |
|                                                                  | 8H  | 21.3                                              | 21.5 | 21.8 | 22.0 | 22.6 | 21.3                                    | 21.5 | 21.8 | 22.0 | 22.6 |
|                                                                  | 12H | 21.6                                              | 21.8 | 22.2 | 22.3 | 22.9 | 21.6                                    | 21.8 | 22.2 | 22.3 | 22.9 |
| 12H                                                              | 4H  | 20.7                                              | 21.0 | 21.2 | 21.4 | 21.9 | 20.7                                    | 21.0 | 21.2 | 21.4 | 21.9 |
|                                                                  | 6H  | 21.1                                              | 21.3 | 21.6 | 21.8 | 22.4 | 21.1                                    | 21.3 | 21.6 | 21.8 | 22.4 |
|                                                                  | 8H  | 21.3                                              | 21.5 | 21.9 | 22.0 | 22.6 | 21.3                                    | 21.5 | 21.9 | 22.0 | 22.6 |
| Corrected glare indices referring to 1689 lm total luminous flux |     |                                                   |      |      |      |      |                                         |      |      |      |      |