

# Light Measurement Report

Print date: 28-2-2025

Measurement date and time: 28-2-2025 11:20:34 – Measurement no. VFR-250228-0258-MS

Measurement tracking No. and Link: [VT250228-003270](#)

Operator:



## Laboratory and Equipment

Laboratory Owner and Location

Goniospectrometer System and Type

Sensor Name, Calibr. Date and Serial No.

Spectrometer Manufacturer and Model

Viso Systems, Copenhagen V, Denmark

LabSpion – Type C, horizontal

LabSensor Model2 – 11-1-2024 – 3130191315

Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

## Measurement Conditions

Number of C-planes and Resolution

$\gamma$  (gamma)-Resolution

Test Distance

Input Power, Power and Displ. Factors

Input RMS Voltage and Current

Frequency of Input Power

Warm-up Time and Variation

12 planes – 30°

5°

12,10 m

11,7 W – PF 0,89 – DPF 0,92

230 V – 0,057 A

50 Hz

Lamp stabilized in 15 min 4 sec – 2,0%

## Tested Light Source

Product Name

Item No. and Manufacturer

Product Description (line 1)

276734-3000K-11W

276734-3000K-11W – Dutchfulfillment

LED TL-BUIS | T8 | 105CM | 8W/11W/14W | CCT-SWITCH

## Main Light Measurement Results

Output – Total Lumen (Up% / Down%)

Efficiency

Peak Intensity and Beam Angle

Correlated Color Temperature, Target/Measured

Color Rendering Index

Color Rendering TM30-18

Color Shift, CIE duv and MacAdam Steps

Flicker

1352 lm – 8,86% / 91,14%

115 lm/W

382 cd – 117,7°

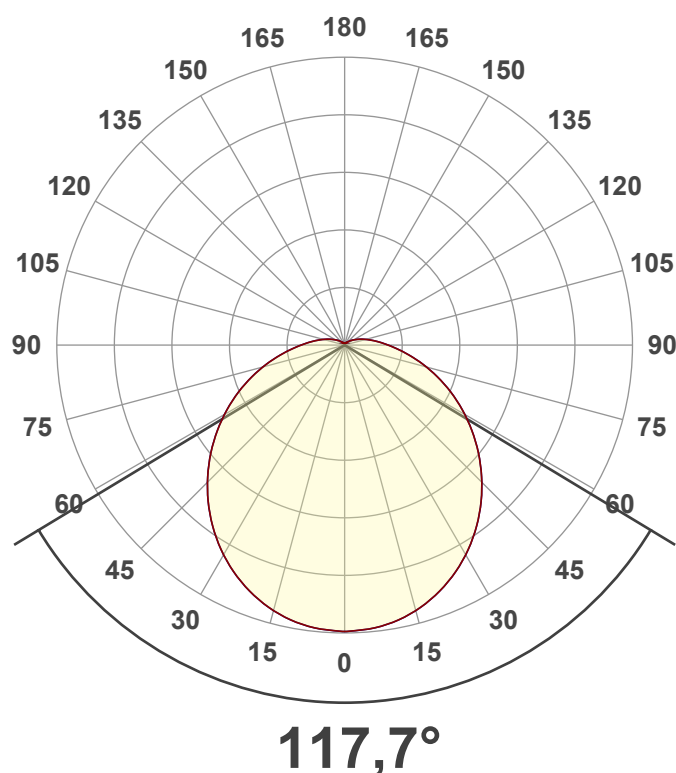
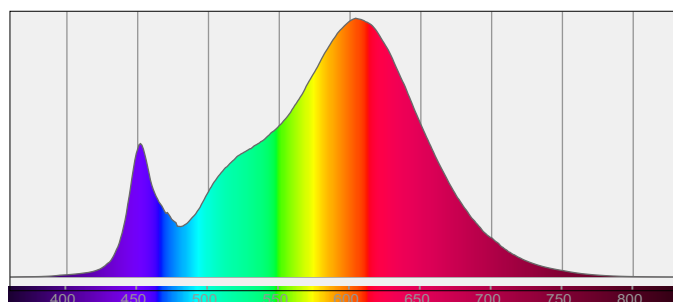
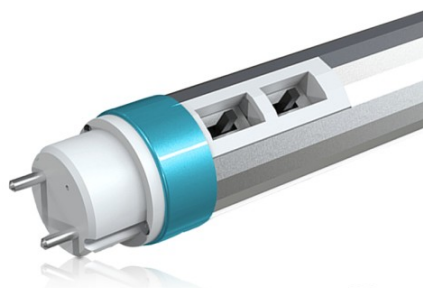
CCT = 3000 K / 2971 K

CRI 84,3

R<sub>f</sub> 86,1 – R<sub>g</sub> 95,9

Duv -0,0004 – SDCM 1,0

SVM 1,57 – PstLM 0,09



# Light Measurement Report

Print date: 28-2-2025

Measurement date and time: 28-2-2025 11:20:34 – Measurement no. VFR-250228-0258-MS

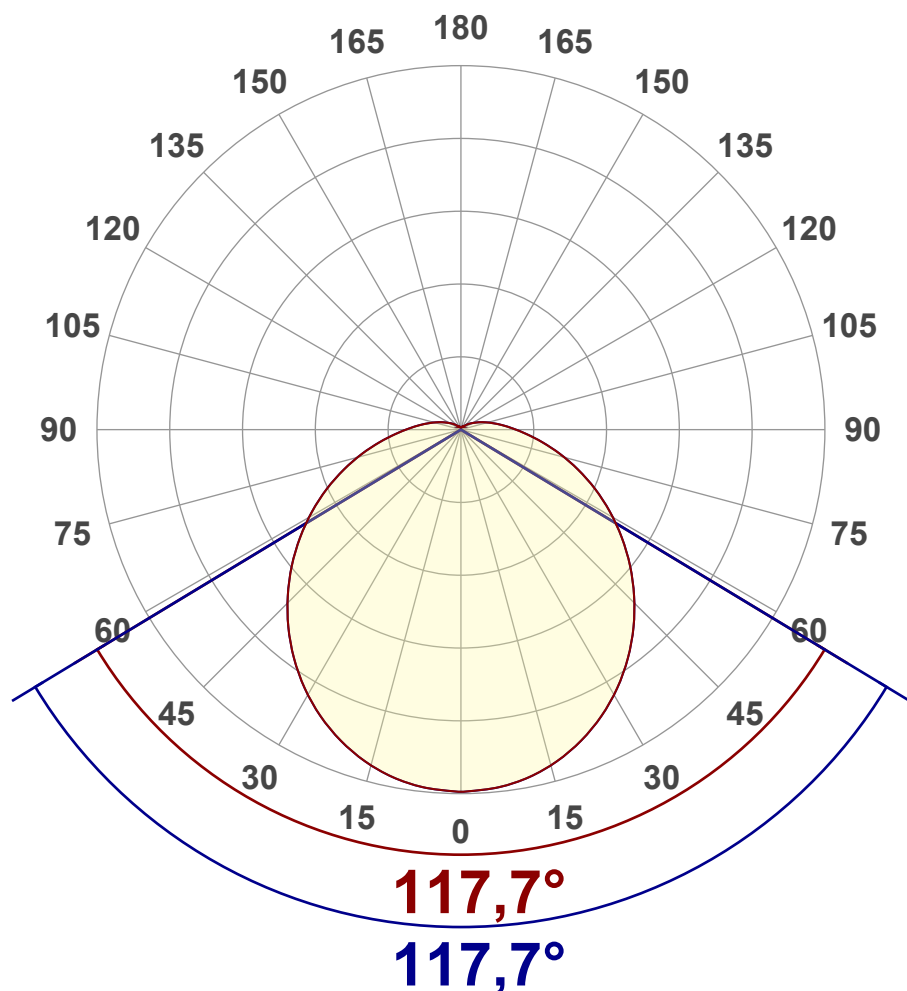
Measurement tracking No. and Link: [VT250228-003270](#)

Operator:



## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

|                      |                |
|----------------------|----------------|
| Output (total Lumen) | 1352 lm        |
| Lumen Up% / Down%    | 8,86% / 91,14% |
| Peak Intensity       | 382 cd         |
| Beam Angle (50%)     | 117,7°         |
| Beam Angle (90%)     | 117,7°         |
| Beam Angle (10%)     | 117,7°         |

## Cut-off Angle

|              |        |
|--------------|--------|
| Average 2,5% | 254,9° |
|--------------|--------|

## Field Angle

|             |        |
|-------------|--------|
| Average 10% | 198,6° |
|-------------|--------|

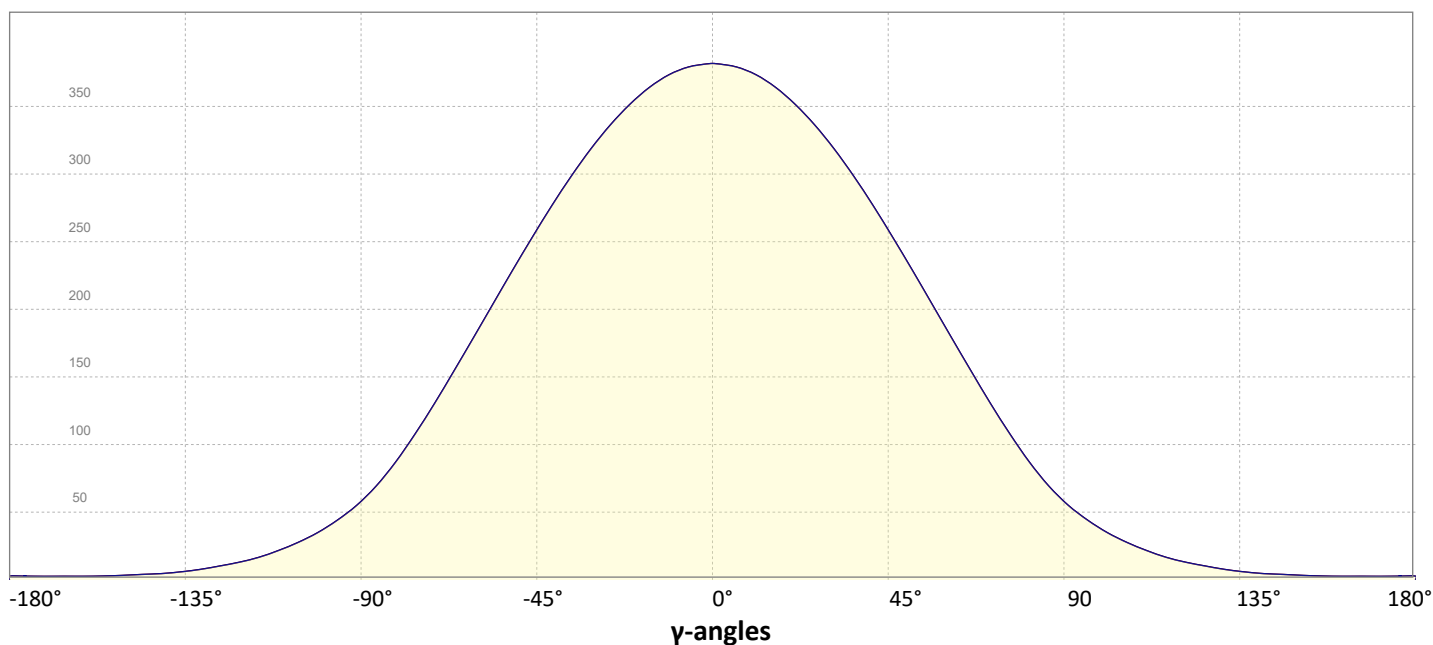
## Intensity Ratio

|              |       |
|--------------|-------|
| In 120° cone | 64,6% |
| In 90° cone  | 43,3% |

C000-C180

C090-C270

## Linear distribution diagram - Intensity (candela) vs γ-angle

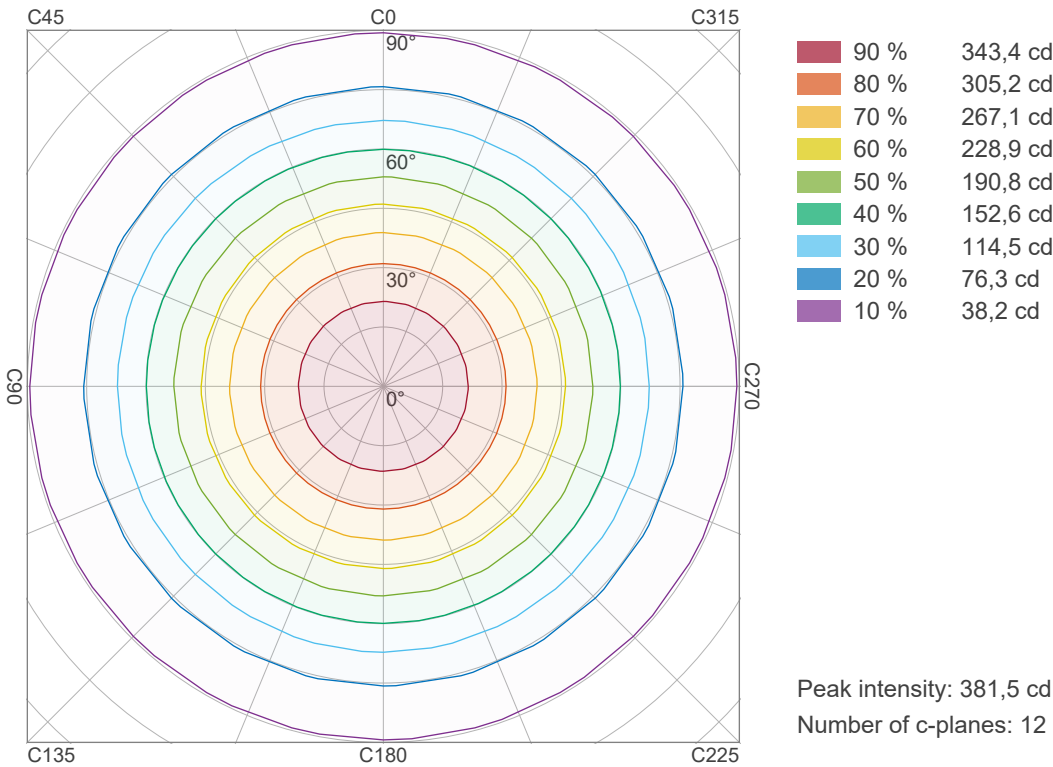


# Light Measurement Report

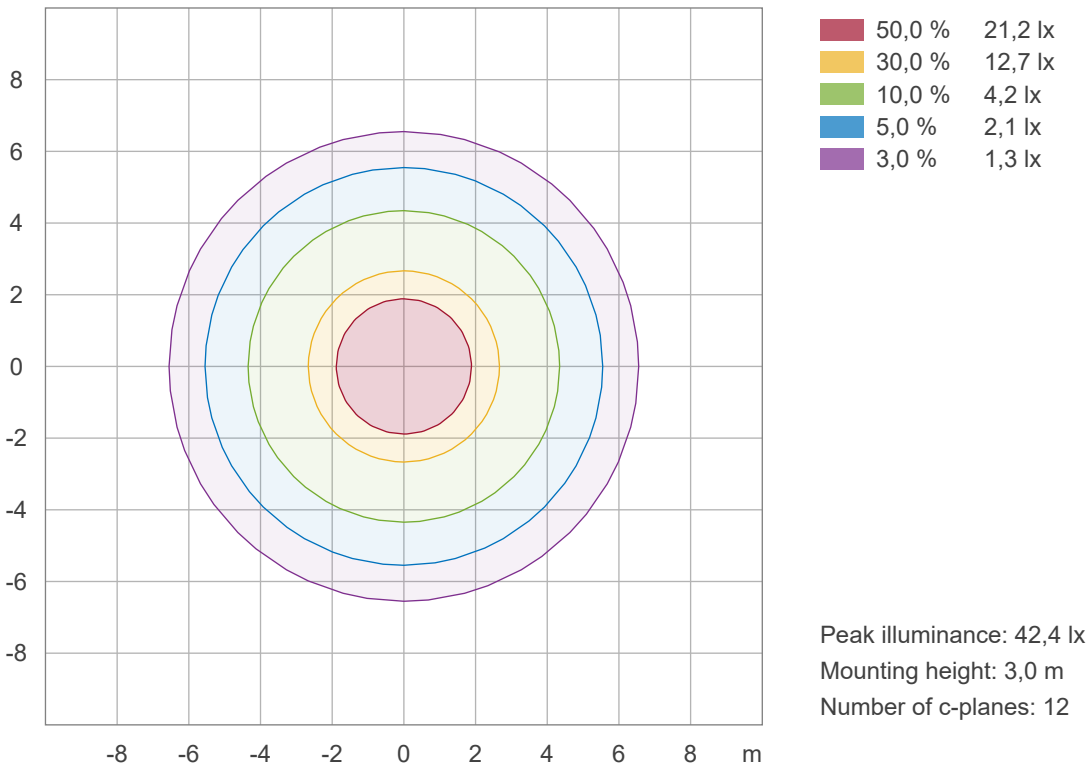
Print date: 28-2-2025  
Measurement date and time: 28-2-2025 11:20:34 – Measurement no. VFR-250228-0258-MS  
Measurement tracking No. and Link: [VT250228-003270](#)  
Operator:



## Iso-intensity Diagram (Iso-candela)



## Iso-illuminance Diagram (Iso-lux)



# Light Measurement Report

Print date: 28-2-2025

Measurement date and time: 28-2-2025 11:20:34 – Measurement no. VFR-250228-0258-MS

Measurement tracking No. and Link: [VT250228-003270](#)

Operator:

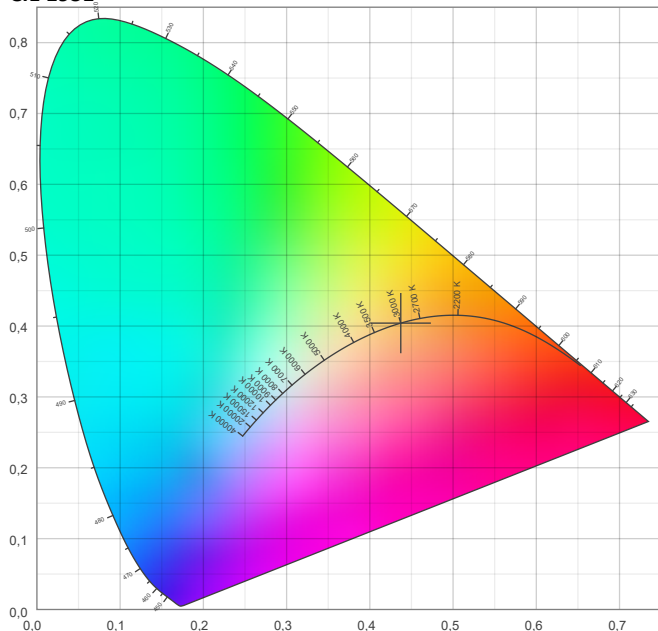


## Color details

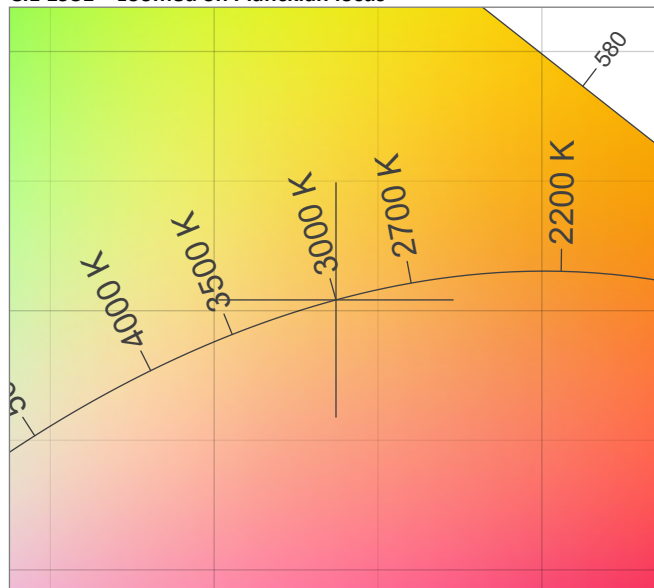
Correlated Color Temperature, Target CCT = 3000 K  
Correlated Color Temperature, Measured CCT = 2971 K  
Color Rendering Index CRI 84,3  
Color Rendering Index, R9 (red component) R9 = 12,7  
Color Rendering TM30-18 R<sub>f</sub> 86,1 – R<sub>g</sub> 95,9  
Color Quality Scale CQS = 83,5

MacAdam Steps  
Color coordinates CIE 1931 (x;y) = (0,437;0,404)  
Color coordinate CIEs 1960 (u;v) = (0,251;0,348)  
Color deviation from BBL Duv = -0,0004  
Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,251;0,521)

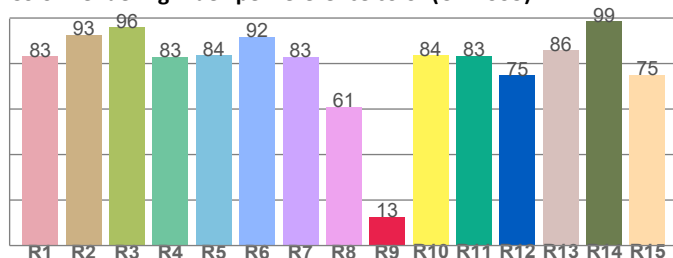
## CIE 1931



## CIE 1931 – zoomed on Planckian locus



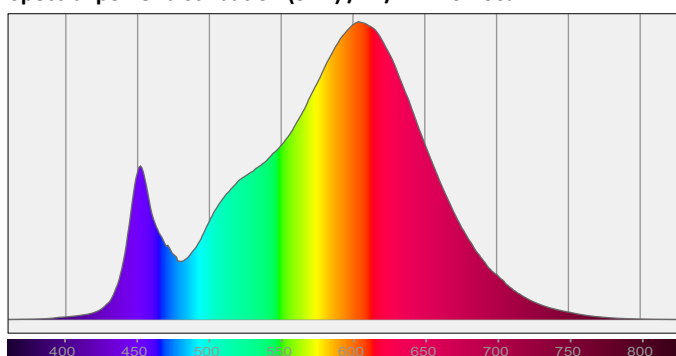
## Color Rendering Index per reference color (CIE 1995)



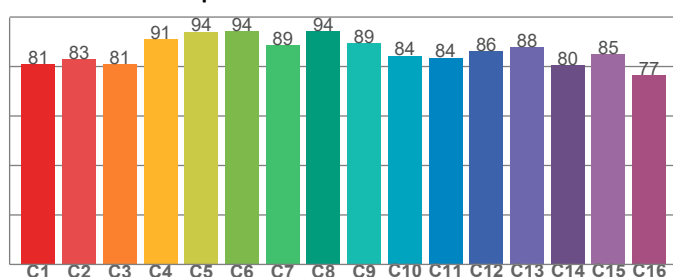
CRI R values, only R1-R8 are used to calculate final CRI value

| R1   | R2   | R3   | R4   | R5   | R6   | R7   | R8   | R9   | R10  | R11  | R12  | R13  | R14  | R15  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 83,3 | 92,7 | 95,9 | 83,0 | 83,7 | 91,8 | 83,0 | 60,9 | 12,7 | 83,6 | 83,4 | 74,8 | 85,8 | 98,5 | 75,0 |

## Spectral power distribution (SPD) / W/nm – 0-100%



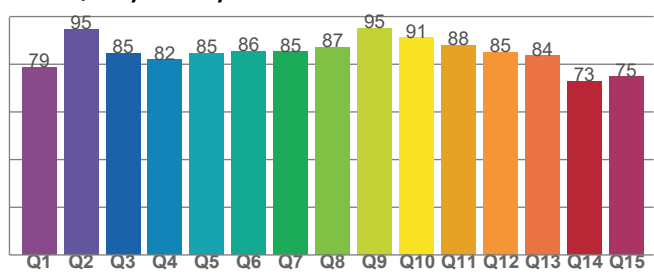
## TM30-18 R<sub>f</sub>-values per hue bin



TM30 C values, 16 binned values out of total of 99 C values

| C1   | C2   | C3   | C4   | C5   | C6   | C7   | C8   | C9   | C10  | C11  | C12  | C13  | C14  | C15  | C16  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 81,0 | 82,9 | 81,0 | 90,9 | 94,0 | 94,2 | 88,6 | 94,2 | 89,4 | 84,4 | 83,6 | 86,2 | 87,7 | 80,5 | 85,1 | 76,5 |

## Color Quality Scale by reference color



CQS Q values

| Q1   | Q2   | Q3   | Q4   | Q5   | Q6   | Q7   | Q8   | Q9   | Q10  | Q11  | Q12  | Q13  | Q14  | Q15  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 78,6 | 94,6 | 84,7 | 81,9 | 84,7 | 85,6 | 85,3 | 87,1 | 95,1 | 91,1 | 87,9 | 85,0 | 83,6 | 72,8 | 74,7 |

# Light Measurement Report

Print date: 28-2-2025

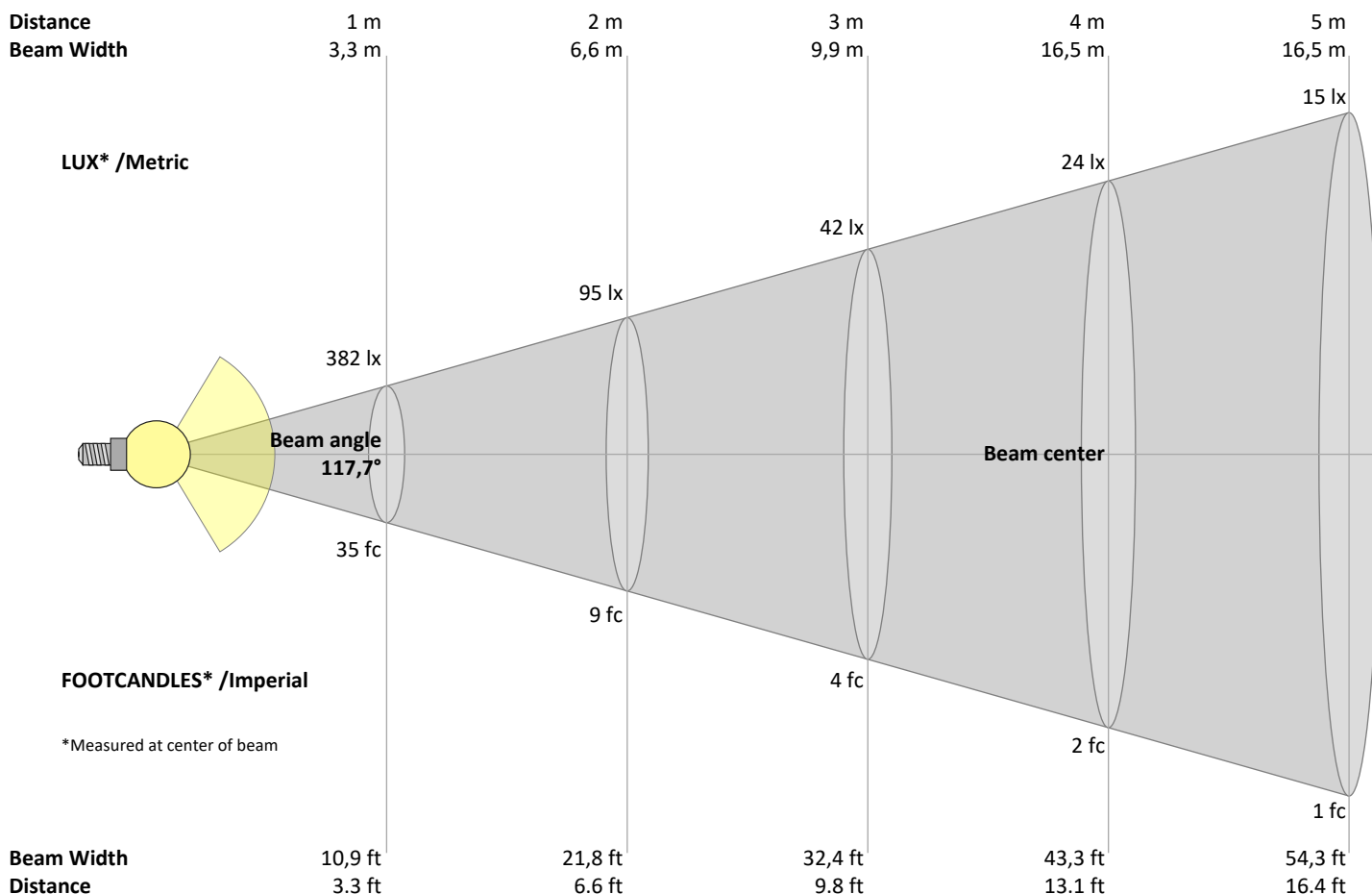
Measurement date and time: 28-2-2025 11:20:34 – Measurement no. VFR-250228-0258-MS

Measurement tracking No. and Link: [VT250228-003270](#)

Operator:



## Beam Details



# Light Measurement Report

Print date: 28-2-2025

Measurement date and time: 28-2-2025 11:20:34 – Measurement no. VFR-250228-0258-MS

Measurement tracking No. and Link: [VT250228-003270](#)

Operator:



## Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

| Reflectances                                                         |           |                                                    |      |      |      |      |                                                  |      |      |      |      |
|----------------------------------------------------------------------|-----------|----------------------------------------------------|------|------|------|------|--------------------------------------------------|------|------|------|------|
|                                                                      | ρ Ceiling | 70                                                 | 70   | 50   | 50   | 30   | 70                                               | 70   | 50   | 50   | 30   |
|                                                                      | ρ Walls   | 50                                                 | 30   | 50   | 30   | 30   | 50                                               | 30   | 50   | 30   | 30   |
|                                                                      | ρ Floor   | 20                                                 | 20   | 20   | 20   | 20   | 20                                               | 20   | 20   | 20   | 20   |
| Room size                                                            |           | Viewed Crosswise                                   |      |      |      |      | Viewed Endwise                                   |      |      |      |      |
| H = mounting height above eye level                                  |           | (Viewing direction orthogonal to lamp length axis) |      |      |      |      | (Viewing direction parallel to lamp length axis) |      |      |      |      |
| X                                                                    | Y         |                                                    |      |      |      |      |                                                  |      |      |      |      |
| 2H                                                                   | 2H        | 20,6                                               | 21,8 | 21,0 | 22,3 | 22,7 | 19,7                                             | 20,9 | 20,1 | 21,4 | 21,8 |
|                                                                      | 3H        | 22,5                                               | 23,7 | 23,0 | 24,2 | 24,6 | 21,3                                             | 22,5 | 21,8 | 22,9 | 23,3 |
|                                                                      | 4H        | 23,5                                               | 24,7 | 24,0 | 25,1 | 25,6 | 22,0                                             | 23,2 | 22,6 | 23,6 | 24,1 |
|                                                                      | 6H        | 24,6                                               | 25,6 | 25,1 | 26,1 | 26,6 | 22,8                                             | 23,8 | 23,2 | 24,2 | 24,8 |
|                                                                      | 8H        | 25,1                                               | 26,2 | 25,6 | 26,6 | 27,2 | 23,1                                             | 24,1 | 23,5 | 24,5 | 25,1 |
|                                                                      | 12H       | 25,7                                               | 26,8 | 26,2 | 27,2 | 27,8 | 23,3                                             | 24,4 | 23,8 | 24,8 | 25,4 |
| 4H                                                                   | 2H        | 21,1                                               | 22,3 | 21,6 | 22,7 | 23,1 | 20,4                                             | 21,6 | 20,9 | 22,0 | 22,4 |
|                                                                      | 3H        | 23,3                                               | 24,3 | 23,8 | 24,8 | 25,4 | 22,3                                             | 23,3 | 22,8 | 23,7 | 24,3 |
|                                                                      | 4H        | 24,4                                               | 25,4 | 24,9 | 25,8 | 26,5 | 23,1                                             | 24,1 | 23,7 | 24,6 | 25,2 |
|                                                                      | 6H        | 25,5                                               | 26,4 | 26,1 | 26,9 | 27,5 | 23,9                                             | 24,8 | 24,5 | 25,3 | 25,8 |
|                                                                      | 8H        | 26,2                                               | 27,0 | 26,8 | 27,5 | 28,0 | 24,3                                             | 25,1 | 24,9 | 25,6 | 26,2 |
|                                                                      | 12H       | 26,9                                               | 27,5 | 27,5 | 28,1 | 28,7 | 24,6                                             | 25,3 | 25,3 | 25,9 | 26,5 |
| 8H                                                                   | 4H        | 24,6                                               | 25,4 | 25,2 | 25,9 | 26,5 | 23,5                                             | 24,3 | 24,1 | 24,8 | 25,4 |
|                                                                      | 6H        | 26,0                                               | 26,6 | 26,6 | 27,2 | 27,9 | 24,6                                             | 25,2 | 25,2 | 25,8 | 26,5 |
|                                                                      | 8H        | 26,8                                               | 27,3 | 27,4 | 28,0 | 28,7 | 25,1                                             | 25,6 | 25,7 | 26,3 | 27,1 |
|                                                                      | 12H       | 27,6                                               | 28,1 | 28,3 | 28,7 | 29,4 | 25,6                                             | 26,0 | 26,3 | 26,7 | 27,4 |
| 12H                                                                  | 4H        | 24,7                                               | 25,3 | 25,3 | 25,9 | 26,5 | 23,6                                             | 24,3 | 24,2 | 24,8 | 25,5 |
|                                                                      | 6H        | 26,1                                               | 26,6 | 26,7 | 27,3 | 28,1 | 24,7                                             | 25,3 | 25,4 | 25,9 | 26,7 |
|                                                                      | 8H        | 26,9                                               | 27,4 | 27,6 | 28,0 | 28,7 | 25,3                                             | 25,8 | 26,0 | 26,4 | 27,2 |
| Variations with the observer position for the luminaire spacings, S: |           |                                                    |      |      |      |      |                                                  |      |      |      |      |
| S = 1.0H                                                             |           | 0,1 / 0,0                                          |      |      |      |      | 0,1 / -0,1                                       |      |      |      |      |
| S = 1.5H                                                             |           | 0,1 / -0,1                                         |      |      |      |      | 0,1 / -0,1                                       |      |      |      |      |
| S = 2.0H                                                             |           | 0,3 / -0,3                                         |      |      |      |      | 0,2 / -0,3                                       |      |      |      |      |

## 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 Lumen delivered to the task surface |     |     |     |     |     |     |     |     |     |    |    |    |    |
| 0                   | 117 | 117                      | 117 | 117 | 113                                                                            | 113 | 113 | 113 | 106 | 106 | 106 | 100 | 100 | 100 | 94 | 94 | 94 | 91 |
| 1                   | 105 | 99                       | 94  | 89  | 101                                                                            | 96  | 91  | 87  | 90  | 86  | 83  | 84  | 81  | 79  | 79 | 77 | 75 | 72 |
| 2                   | 94  | 85                       | 78  | 71  | 91                                                                             | 83  | 76  | 70  | 77  | 72  | 67  | 73  | 68  | 64  | 69 | 65 | 61 | 58 |
| 3                   | 86  | 74                       | 66  | 59  | 82                                                                             | 72  | 64  | 57  | 68  | 61  | 55  | 64  | 58  | 53  | 60 | 55 | 51 | 48 |
| 4                   | 78  | 66                       | 56  | 49  | 75                                                                             | 64  | 55  | 48  | 60  | 53  | 47  | 56  | 50  | 45  | 53 | 48 | 44 | 41 |
| 5                   | 72  | 58                       | 49  | 42  | 69                                                                             | 57  | 48  | 41  | 54  | 46  | 40  | 51  | 44  | 39  | 48 | 42 | 38 | 35 |
| 6                   | 66  | 52                       | 43  | 36  | 64                                                                             | 51  | 42  | 36  | 48  | 41  | 35  | 46  | 39  | 34  | 43 | 37 | 33 | 31 |
| 7                   | 61  | 47                       | 38  | 32  | 59                                                                             | 46  | 38  | 32  | 44  | 36  | 31  | 42  | 35  | 30  | 39 | 34 | 29 | 27 |
| 8                   | 57  | 43                       | 34  | 28  | 55                                                                             | 42  | 34  | 28  | 40  | 33  | 27  | 38  | 32  | 27  | 36 | 30 | 26 | 24 |
| 9                   | 53  | 40                       | 31  | 26  | 51                                                                             | 39  | 31  | 25  | 37  | 30  | 25  | 35  | 29  | 24  | 33 | 28 | 23 | 22 |
| 10                  | 50  | 36                       | 28  | 23  | 48                                                                             | 36  | 28  | 23  | 34  | 27  | 22  | 32  | 26  | 22  | 31 | 25 | 21 | 19 |

# Light Measurement Report

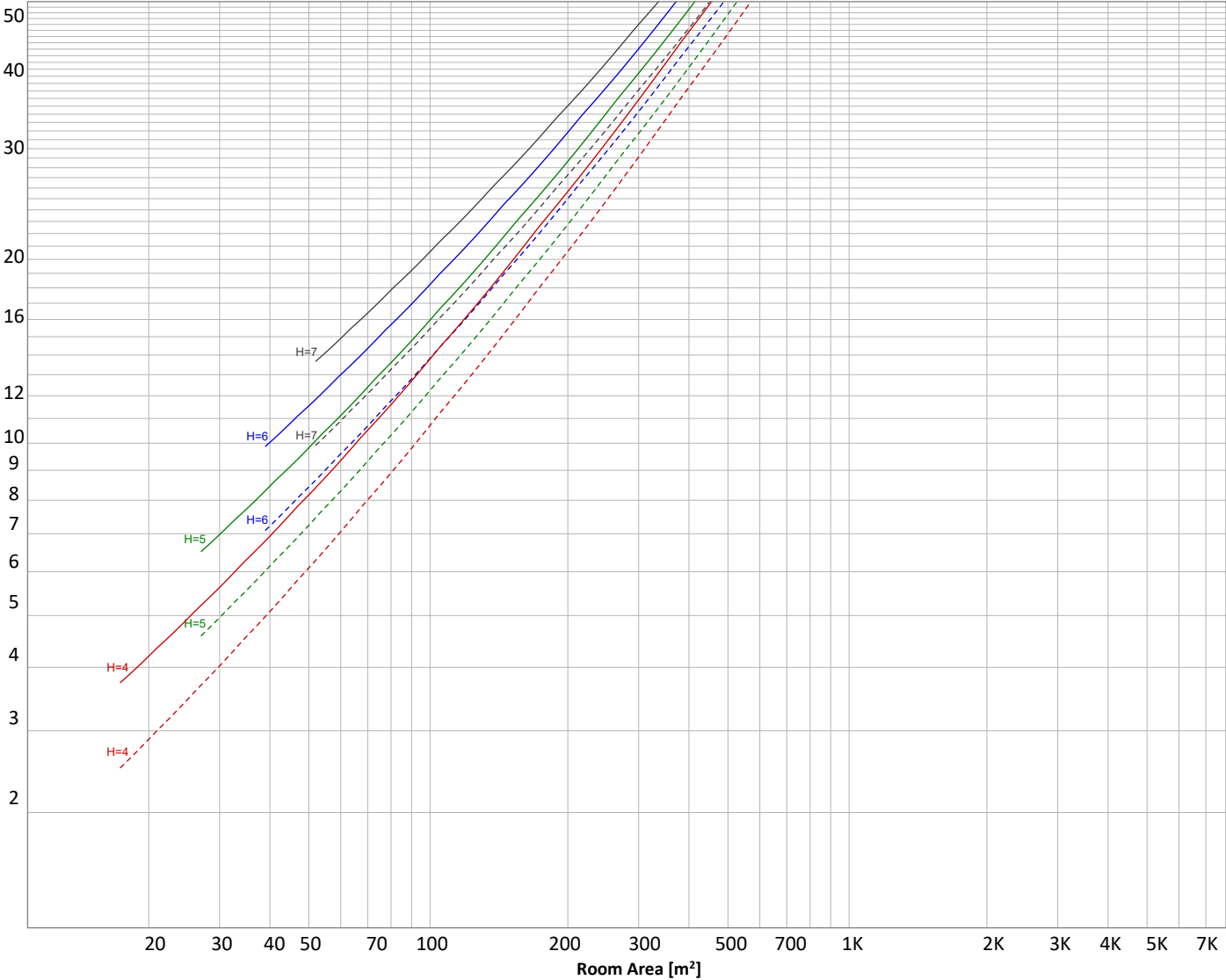
Print date: 28-2-2025  
Measurement date and time: 28-2-2025 11:20:34 – Measurement no. VFR-250228-0258-MS  
Measurement tracking No. and Link: [VT250228-003270](#)  
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

|                                                   |                |           |                     |                   |
|---------------------------------------------------|----------------|-----------|---------------------|-------------------|
| H = Room height                                   | Flux = 1352 lm | p(%)      |                     |                   |
| H <sub>down</sub> = Lamp distance from ceiling =  | 0.00 m         | Line type | Ceiling reflectance | Wall reflectance  |
| H <sub>work</sub> = Work area height from floor = | 0.00 m         | -----     | 70                  | 50                |
| E <sub>work</sub> = Average lux on work area =    | 100 lx         | _____     | 50                  | 30                |
|                                                   |                |           |                     | Floor reflectance |
|                                                   |                |           |                     | 30                |
|                                                   |                |           |                     | 20                |

## Zonal Lumen Summary

|          |           |           |           |           |           |           |           |           |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 0°-10°   | 10°-20°   | 20°-30°   | 30°-40°   | 40°-50°   | 50°-60°   | 60°-70°   | 70°-80°   | 80°-90°   |
| 36,1 lm  | 103 lm    | 157 lm    | 190 lm    | 200 lm    | 188 lm    | 159 lm    | 120 lm    | 80,5 lm   |
| 90°-100° | 100°-110° | 110°-120° | 120°-130° | 130°-140° | 140°-150° | 150°-160° | 160°-170° | 170°-180° |
| 51,0 lm  | 31,2 lm   | 17,9 lm   | 9,81 lm   | 4,94 lm   | 2,57 lm   | 1,36 lm   | 0,734 lm  | 0,249 lm  |

Light Measurement Report

Print date: 28-2-2025  
Measurement date and time: 28-2-2025 11:20:34 – Measurement no. VFR-250228-0258-MS  
Measurement tracking No. and Link: [VT250228-003270](#)  
Operator:



Outdoor Light Planning

Lumen per Zone

| Zone (γ) | Lumen           | % Total |
|----------|-----------------|---------|
| 0-10°    | {LUM00-10} lm   | #VALUE! |
| 10-20°   | {LUM10-20} lm   | #VALUE! |
| 20-30°   | {LUM20-30} lm   | #VALUE! |
| 30-40°   | {LUM30-40} lm   | #VALUE! |
| 40-50°   | {LUM40-50} lm   | #VALUE! |
| 50-60°   | {LUM50-60} lm   | #VALUE! |
| 60-70°   | {LUM60-70} lm   | #VALUE! |
| 70-80°   | {LUM70-80} lm   | #VALUE! |
| 80-90°   | {LUM80-90} lm   | #VALUE! |
| 90-100°  | {LUM90-100} lm  | #VALUE! |
| 100-110° | {LUM100-110} lm | #VALUE! |
| 110-120° | {LUM110-120} lm | #VALUE! |
| 120-130° | {LUM120-130} lm | #VALUE! |
| 130-140° | {LUM130-140} lm | #VALUE! |
| 140-150° | {LUM140-150} lm | #VALUE! |
| 150-160° | {LUM150-160} lm | #VALUE! |
| 160-170° | {LUM160-170} lm | #VALUE! |
| 170-180° | {LUM170-180} lm | #VALUE! |
| Total    | 0 lm            | #VALUE! |

Intensity peaks

|                |            |
|----------------|------------|
| Max intensity  | {PEAK} cd  |
| Intensity, 90° | {INT90} cd |
| Intensity, 0°  | {INT0} cd  |

Zonal Lumen summary

| Zone (γ) | Lumen          | % Total |
|----------|----------------|---------|
| 0-30°    | {LUM00-30} lm  | #VALUE! |
| 0-40°    | {LUM00-40} lm  | #VALUE! |
| 0-60°    | {LUM00-60} lm  | #VALUE! |
| 60-90°   | {LUM60-90} lm  | #VALUE! |
| 70-100°  | {LUM70-100} lm | #VALUE! |
| 90-120°  | {LUM90-120} lm | #VALUE! |
| 0-90°    | {LUM00-90} lm  | #VALUE! |
| 90-180°  | {LUM90-180} lm | #VALUE! |
| 0-180°   | {LUM00-180} lm | #VALUE! |

BUG rating

|                   | Lumen     | % Total |
|-------------------|-----------|---------|
| Forward light     |           |         |
| Low(0-30°)        | {BUG0} lm | #VALUE! |
| Medium(30-60°)    | {BUG1} lm | #VALUE! |
| High(60-80°)      | {BUG2} lm | #VALUE! |
| Very high(80-90°) | {BUG3} lm | #VALUE! |

Back light

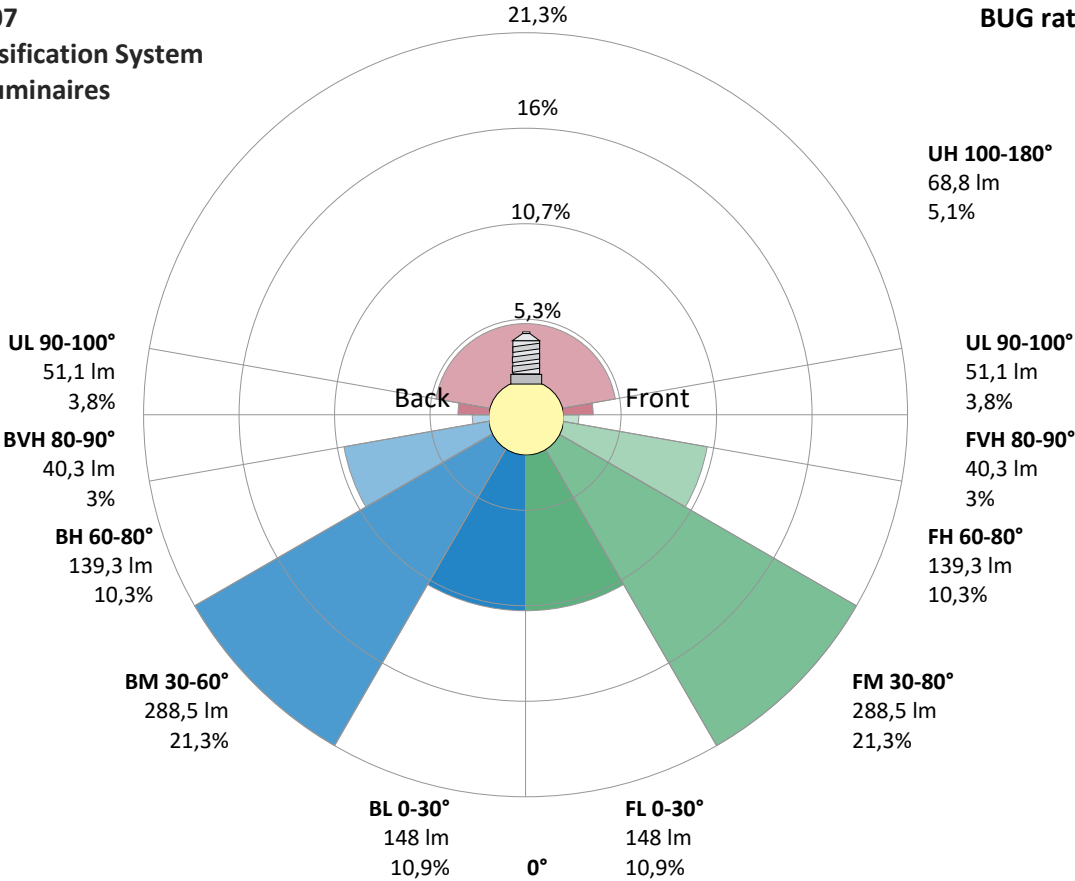
|                   |           |         |
|-------------------|-----------|---------|
| Low(0-30°)        | {BUG4} lm | #VALUE! |
| Medium(30-60°)    | {BUG5} lm | #VALUE! |
| High(60-80°)      | {BUG6} lm | #VALUE! |
| Very high(80-90°) | {BUG7} lm | #VALUE! |

Uplight

|                |           |         |
|----------------|-----------|---------|
| Low(90-100°)   | {BUG8} lm | #VALUE! |
| High(100-180°) | {BUG9} lm | #VALUE! |

IESNA TM-15-07  
Luminaire Classification System  
For Outdoor Luminaires

BUG rating B1 U3 G1



Light Measurement Report

Print date: 28-2-2025  
Measurement date and time: 28-2-2025 11:20:34 – Measurement no. VFR-250228-0258-MS  
Measurement tracking No. and Link: [VT250228-003270](#)  
Operator:

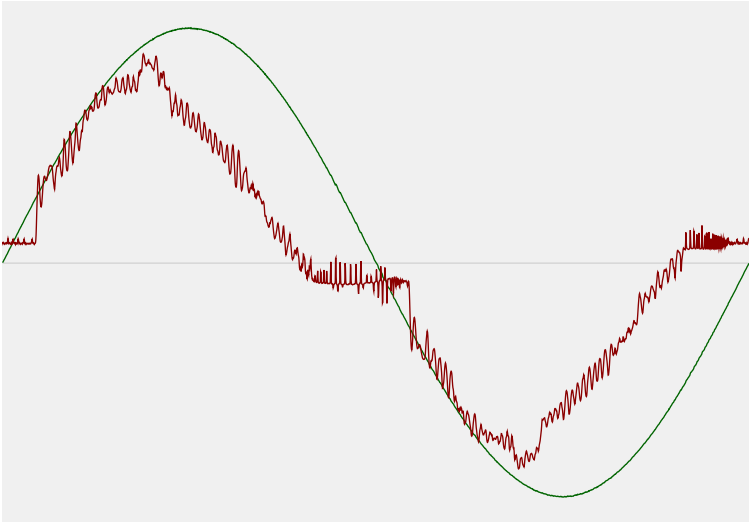


Power Details

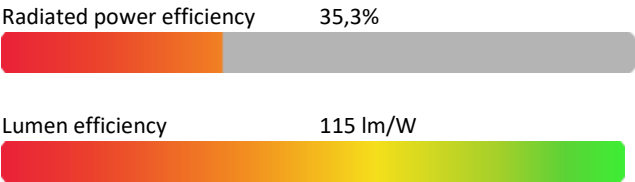
Input Power

|                                                         |          |
|---------------------------------------------------------|----------|
| Power feed to light source                              | 11,7 W   |
| Frequency of input power                                | 50 Hz    |
| RMS Input voltage feed, $V_{RMS}$                       | 230 V    |
| RMS Input current feed, $I_{RMS}$                       | 0,057 A  |
| Volt-Ampere or apparent power = $V_{RMS} \cdot I_{RMS}$ | 13,21 VA |
| Displacement factor of AC power feed                    | 0,92     |
| Power factor of AC current feed                         | 0,89     |
| Total harmonic distortion of the current                | 27,02%   |
| Total harmonic distortion of the voltage                | 0,07%    |

Input Power Curve



Efficiency



Stabilization Details

Warmup Conditions

|                   |        |
|-------------------|--------|
| Stable period     | 15 min |
| Stable change max | 2,0%   |
| Minimum time      | 15 min |

Color Temperature Change

|           |        |
|-----------|--------|
| CCT start | 3000 K |
| CCT shift | 0 K    |
| CCT end   | 3000 K |

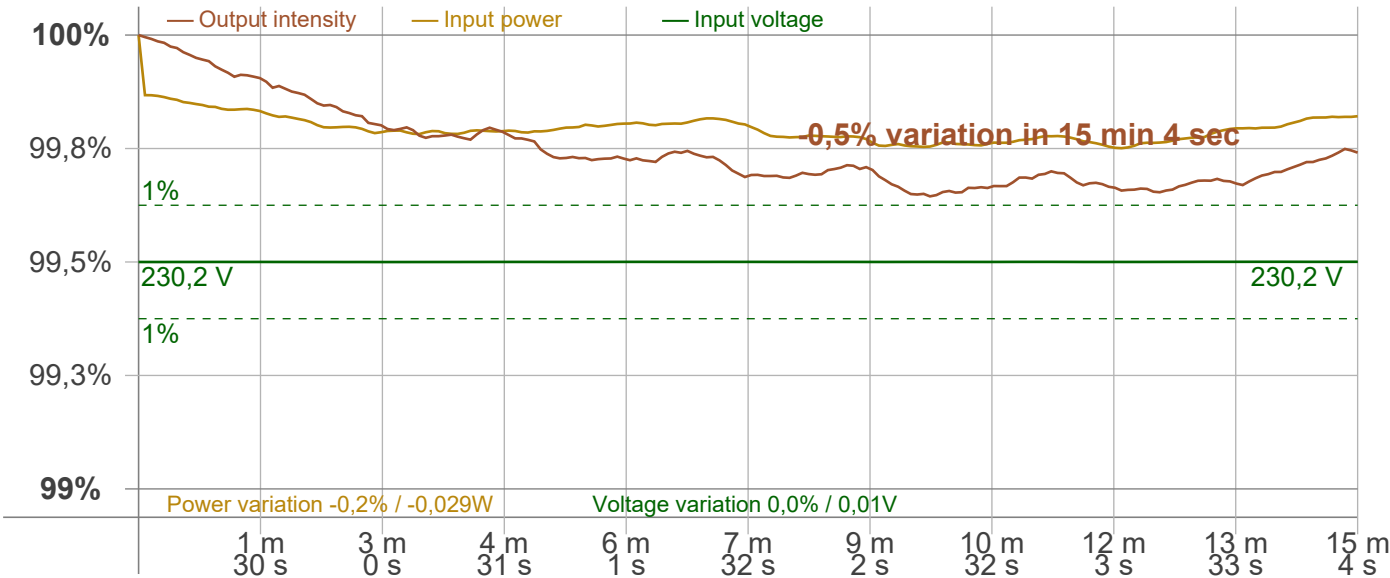
Warmup Result

|                   |                                 |
|-------------------|---------------------------------|
| Total warmup time | Lamp stabilized in 15 min 4 sec |
| Warmup variation  | -0,5%                           |

Output Change

|               |         |
|---------------|---------|
| Output start  | 1356 lm |
| Output change | -4 lm   |
| Output end    | 1352 lm |

Stabilization Curve



# Light Measurement Report

Print date: 28-2-2025  
Measurement date and time: 28-2-2025 11:20:34 – Measurement no. VFR-250228-0258-MS  
Measurement tracking No. and Link: [VT250228-003270](#)  
Operator:



## Flicker /TLA details

Flicker Meter Type Viso Systems LabFlicker  
Frequency of input power 50 Hz  
Flicker/TLA sample rate 20000 samples/s

Measurement time  
PstLM 180 sec  
All other indices 1,2 sec

Flicker indices according to Illuminating Engineering Society (IES)  
Flicker frequency 100 Hz  
Percent Flicker 40,92 %  
Flicker index 0,13

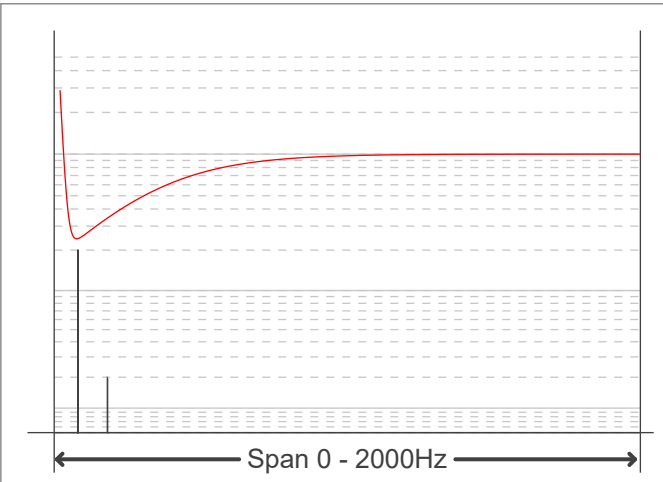
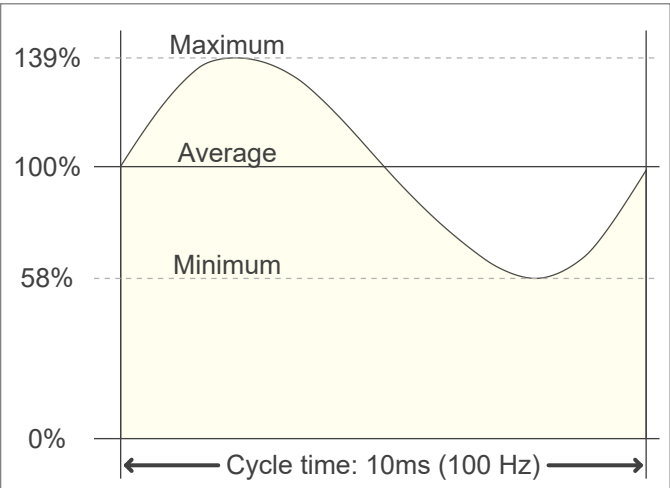
Flicker indices according to California Energy Commission (CEC) 2016b  
JA8/10 40 Hz 0,14 %  
JA8/10 90 Hz 0,37 %  
JA8/10 200 Hz 40,83 %  
JA8/10 400 Hz 41,03 %  
JA8/10 1000 Hz 40,94 %

TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)  
PstLM value (F < 80 Hz) 0,09  
SVM value (80 < F < 2000 Hz) 1,57

Flicker indices according to Lighting Research Center (2015)  
Perception metric, Assist Mp 0,05

Flicker frame (frame of one flicker period in time domain)

Flicker FFT (flicker curve in frequency domain)



IEEE 1789 Frequency/modulation plot

