



PHOTOMETRIC LIGHT REPORT

**Refl downl | white |
Ø228mm | 60° | 3-CCT |
18~30W | EU plug**

Article number: 136-446



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TRONIX



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Introduction

Purpose of this Document

This document provides accurate and objective photometric data for Tronix Lighting item 136-446. All information is based on actual measurements taken from standard production units. No modifications were made to enhance performance results. In some cases, minor adjustments—such as temporary removal of covers, cables, or mounting features—were necessary for testing purposes. These did not influence product performance.

Test Methodology

Testing was conducted using randomly selected, unopened samples from regular inventory. All tests comply with the LM-79-19 standard, the recognized method for photometric and electrical measurements of LED and OLED luminaires. This standard, an update of IES LM-79-2008, outlines environmental test conditions, stabilization procedures, measurement methods, and approved instruments. It uses absolute photometry, meaning results directly reflect the performance of the tested product, without comparison to rated lamp standards.

Product 136-446 was tested using:

- A photogoniometer to measure luminous intensity distribution at various angles
- An integrating sphere to determine total luminous flux and colour characteristics

Compliance & Certification

Item 136-446 meets the requirements of the following EU directives. Tronix Lighting certifies that all relevant tests were executed in accordance with the applicable standards, and the CE mark is applied accordingly:

- General Product Safety – Directive 2023/988/EC
- Low Voltage Directive (LVD) – Directive 2014/35/EU
- Electromagnetic Compatibility (EMC) – Directive 2004/108/EC
- Ecodesign – Directive 2009/125/EC
- RoHS 3 – Directive 2011/65/EU + Amendment 2015/863/EU

Recycling & Sustainability

Tronix Lighting is affiliated with national recycling systems for electrical and electronic waste. The luminaire is over 90% recyclable when disposed of as electronic waste at end of life. In addition, Tronix Lighting participates in national packaging recycling schemes, ensuring full compliance with both the WEEE and packaging directives.



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Laboratory and equipment

Laboratory owner and location	Tronix Lighting BV. Uden. The Netherlands
Gonio spectrometer system and type	Viso Systems Type C. horizontal
Spectrometer manufacturer and model	(Gonio) Ocean Optics STS VIS (Sphere) Admesy HERA VIS 380–780nm
Flicker meter manufacturer and model	Viso Systems LabFlicker
Oscilloscope manufacturer and model	Tektronix MDO3024 oscilloscope (4 Channels. 200 MHz)
Power meter manufacturer and model	Vitrek PA900 Precision Multi-Channel Harmonic Power Analyzer
Power source manufacturer and model	(DC) Keithley Source Measure Unit SMU-2420 3A DC Source Meter (AC) Chroma 61601 AC Source
Datalogger Manufacturer and Model	Omega 8-Channel Thermocouple Thermometer/Data Logger

Measurement conditions gonio spectrometer

Number of C-planes and Resolution	2 planes – 180°
γ (gamma)-Resolution	1°
Test Distance	1.81 m
Room Temperature and Humidity	22°C +/- 10% – RH 50% +/- 20%
Input Power. Power and Displacement Factors	26.9 W – PF 0.95 – DPF 0.95
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 0 sec --0.5%

Tested light source

Manufacturer and Order Code	Tronix Lighting – 136-446
Product Description	Refl downl white Ø228mm 60° 3-CCT 18~30W EU plug

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	2943 lm – 0% / 100%
Efficiency	109 lm/W
Energy efficiency class	E
Peak Intensity and Beam Angle	3258 cd – 54.8°
Correlated Colour Temperature	CCT = 4087 K
Colour Shift. CIE duv	Duv -0.0056
Colour Rendering Index	CRI 86.8
Colour Rendering TM30-18	R _f 84.2 – R _g 95.4
Television Lighting Consistency Index	TLCI = 74
Flicker	SVM 0.01 – PstLM 0.19



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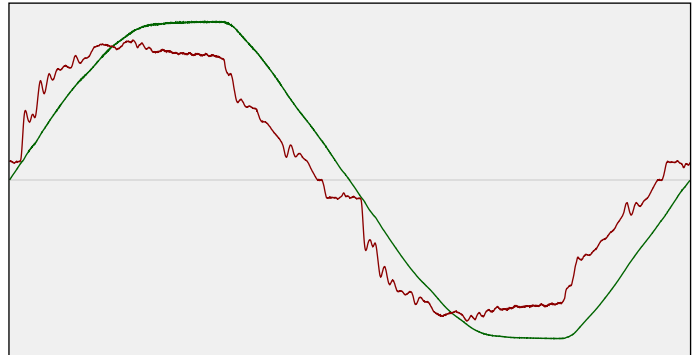
Electrical measurement details

Input Power



RMS Input voltage feed. V_{RMS} 229 V
 RMS Input current feed. I_{RMS} 0.124 A
 Total input power 26.9 W
 Frequency of input power 50 Hz
 Power factor 0.95
 Displacement power factor 0.95
 Total harmonic distortion of the current 10.01%
 Total harmonic distortion of the voltage 3.02%

Input Power Curve

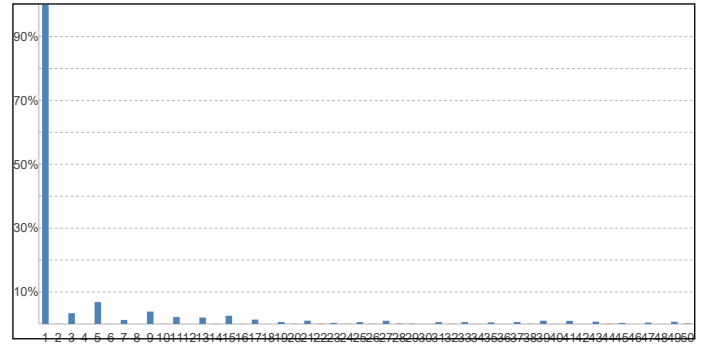
Voltage - Current



Efficiency

Radiated power efficiency: 34.4%

 Lumen efficiency: 109 lm/W


Current Harmonics %



Harmonics

3rd Harmonic 3.37%
 5th Harmonic 6.85%
 7th Harmonic 1.27%
 9th Harmonic 3.89%
 11th Harmonic 2.19%

Stabilization Details

Warm-up Conditions

Stable period 15 min
 Stable change max 2.0%
 Minimum warm-up time 15 min

Colour temperature change during warm-up

CCT start 4064 K
 CCT shift +23 K
 CCT end 4087 K

Warm-up Results

Total warmup time Lamp stabilized in 15 min 0 sec
 Warmup variation -0.5%

Output intensity change during warm-up

Output start 2956 lm
 Output change -13 lm
 Output end 2943 lm



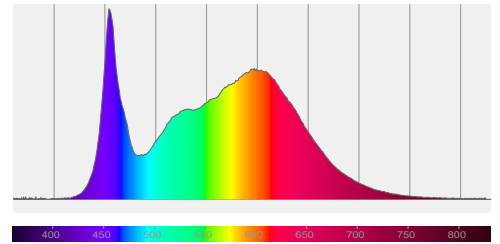
136-446 Refl downl | white | Ø228mm | 60° | 3-CCT | 18~30W | EU plug

Colour measurement details

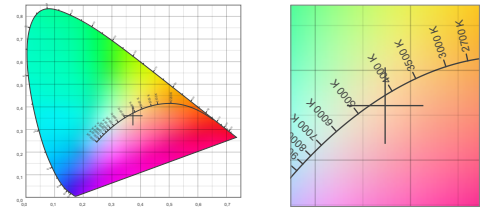
Total lumen output 2943 lm
 Correlated Colour Temperature 4087 K
 Colour coordinates CIE 1931 (x;y) = (0.373;0.361)
 Colour deviation from BBL Duv = -0.0056

TM30-18 Colour Fidelity Index R_f 84.2
 TM30-18 Colour Gamut Index R_g 95.4
 Colour Rendering Index (Ra) CRI 86.8
 Colour Rendering Index. (red component) R9 = 26.7

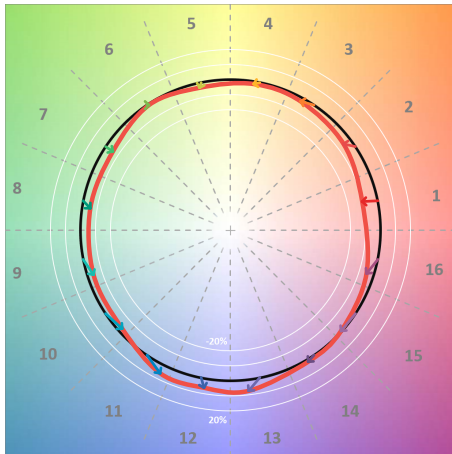
Colour Quality Scale CQS = 83.4
 Television Lighting Consistency Index TLCI = 74



Relative spectral power distribution



TM30 details

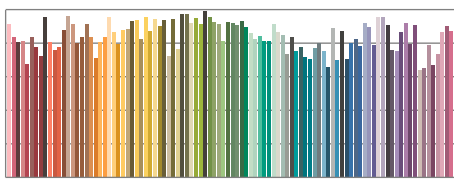


TM30 Colour vectors per hue bin

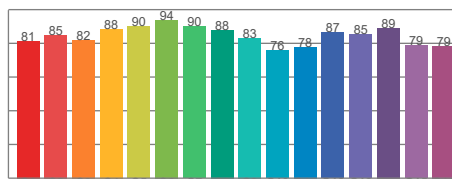


TM30 Colour distortion

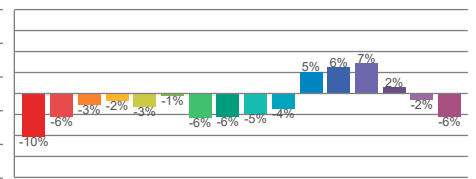
Hue Bin	R _f	Shifts (%)	
		Chroma	Hue
C1	81	-10%	2%
C2	85	-6%	6%
C3	82	-3%	9%
C4	88	-2%	4%
C5	90	-3%	2%
C6	94	-1%	-1%
C7	90	-6%	0%
C8	88	-6%	4%
C9	83	-5%	11%
C10	76	-4%	14%
C11	78	5%	14%
C12	87	6%	3%
C13	85	7%	-9%
C14	89	2%	-6%
C15	79	-2%	-15%
C16	79	-6%	-11%



TM30-18 R_f-values per reference colour

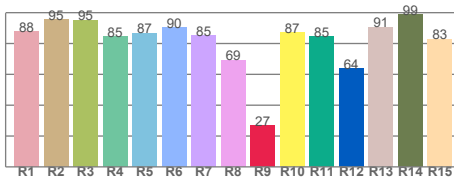


TM30-18 R_f-values per hue bin

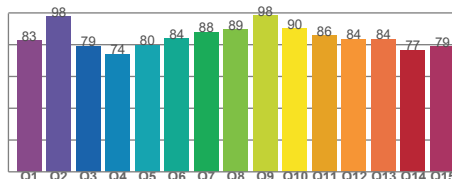


TM30 Chroma shift

Colour Quality details



Colour Rendering Index



Colour Quality Scale

Document revision date: 1-7-2025 Measurement serial: VFR-250130-1758-MS



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Flicker / temporal light artefacts details

Measurement conditions

Flicker meter type	Viso Systems LabFlicker
Flicker/TLA sample rate	20000 samples/s
Measurement time	5x 180 seconds (15 minutes) for PstLM. 1.2 sec for all other indices

Flicker indices according to Illuminating Engineering Society (IES)

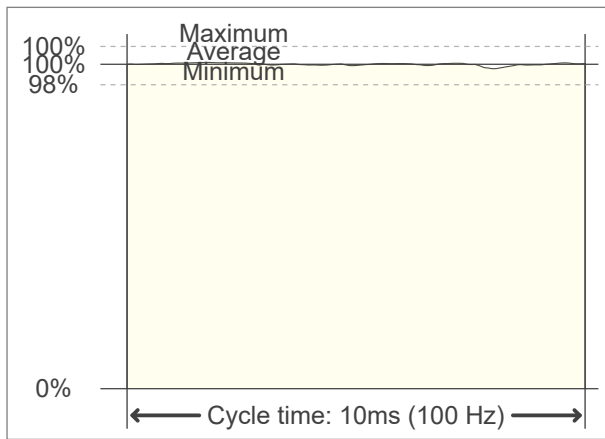
Flicker frequency	100 Hz
Percent flicker	1.73 %
Flicker index	0

TLA indices (according IEC TR 61547-1, EN 61000-3-3 and EN 61000-4-15)

An LED luminaire is considered flicker-free if the SVM value is ≤ 0.4 and if the PstLM value is ≤ 1.0

PstLM value (F < 80 Hz)	0.19
SVM value (80 < F < 2000 Hz)	0.01

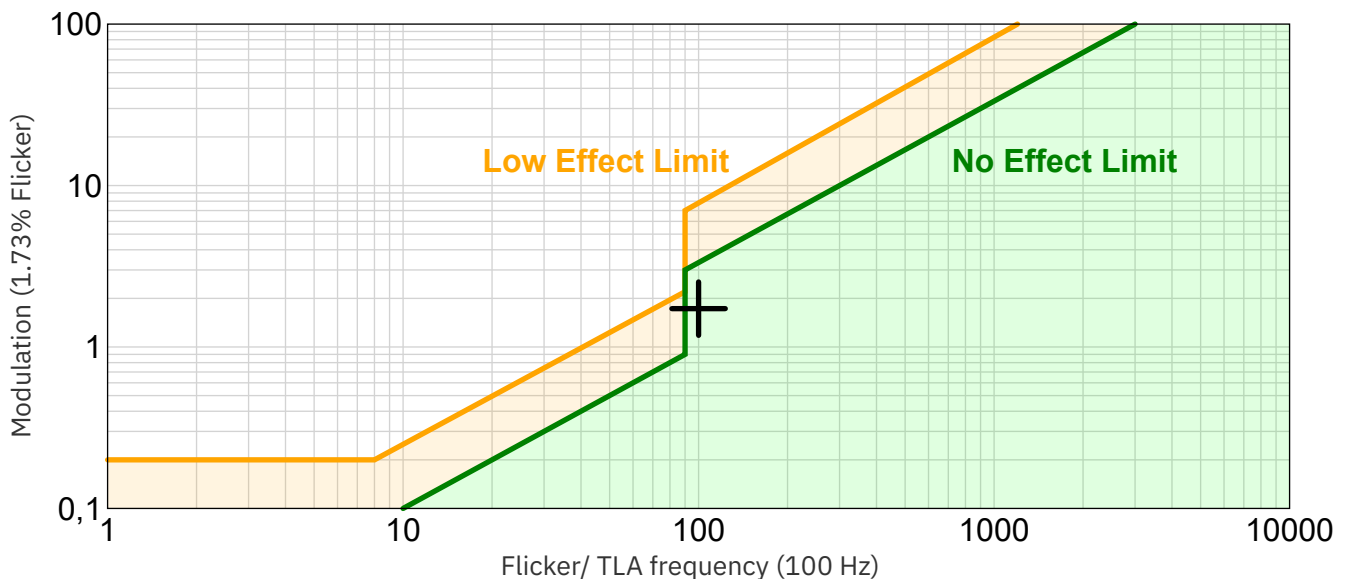
Flicker frame (one flicker period in time domain)



Flicker FFT (flicker curve in frequency domain)



IEEE 1789-2015 Lighting Flicker Risk Zones



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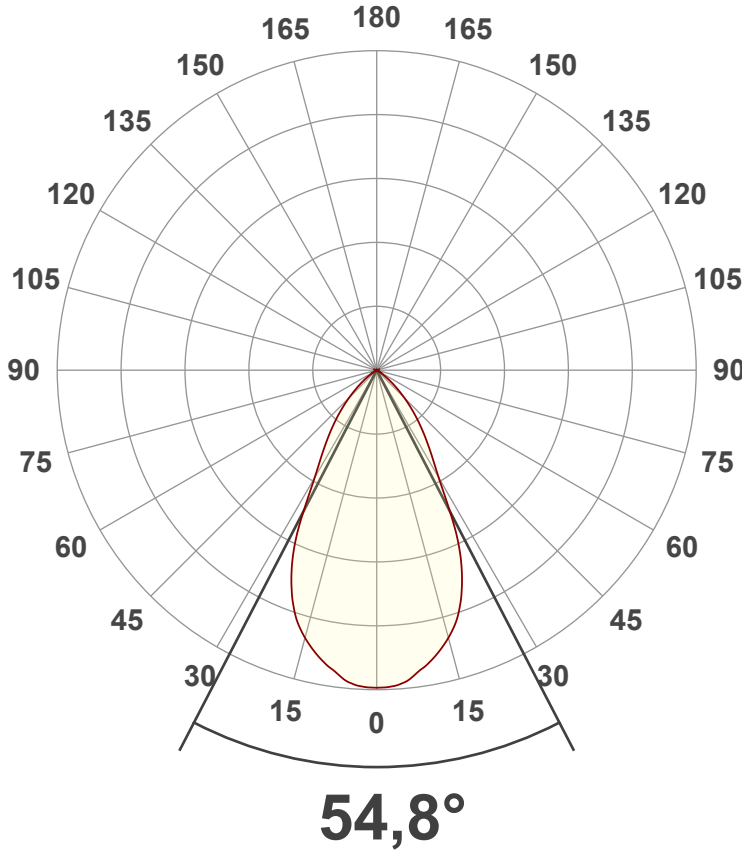


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Beam angle

Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2943 lm
Lumen Up/Down	0% / 100%
Peak Intensity	3258 cd
Beam Angle (50%)	54.8°
Beam Angle (90%)	54.8°
Beam Angle (10%)	54.8°

Cut-off Angle

Average 2.5%	109.9°
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Field Angle

Average 10%	93.8°
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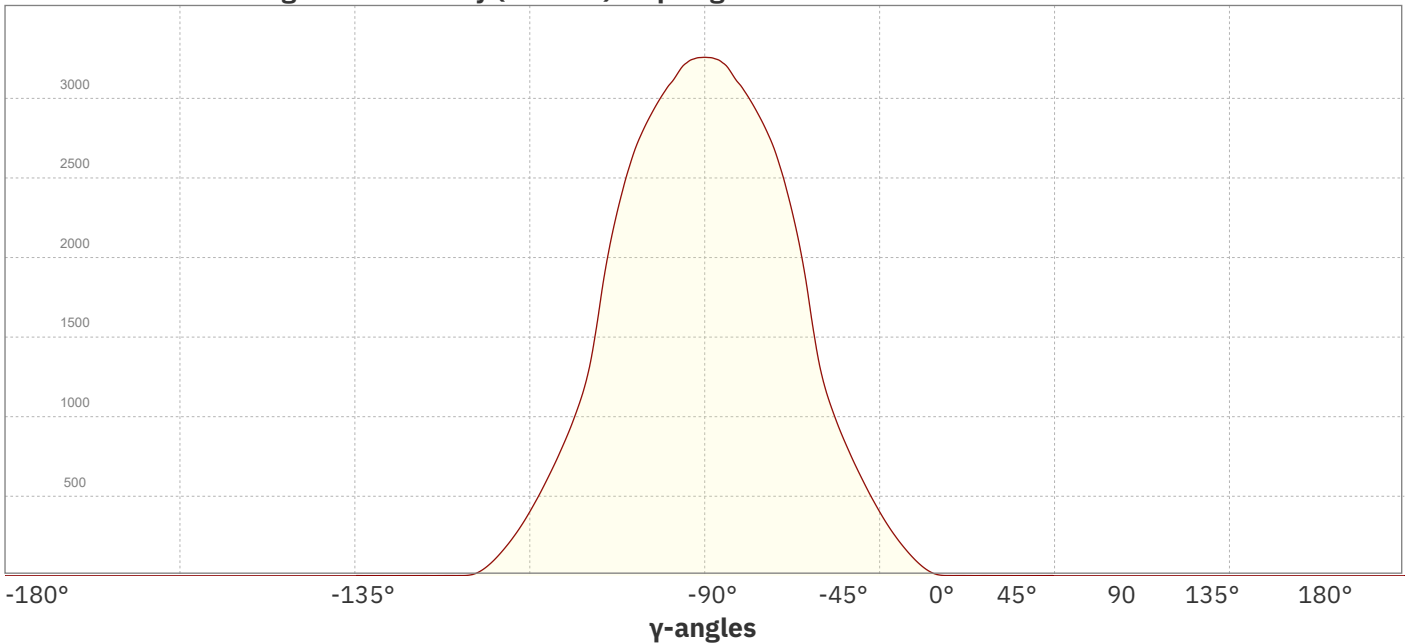
Intensity Ratio

In 120° cone	99.8%
In 90° cone	93.0%

C planes

- C000-C180
- C090-C270

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

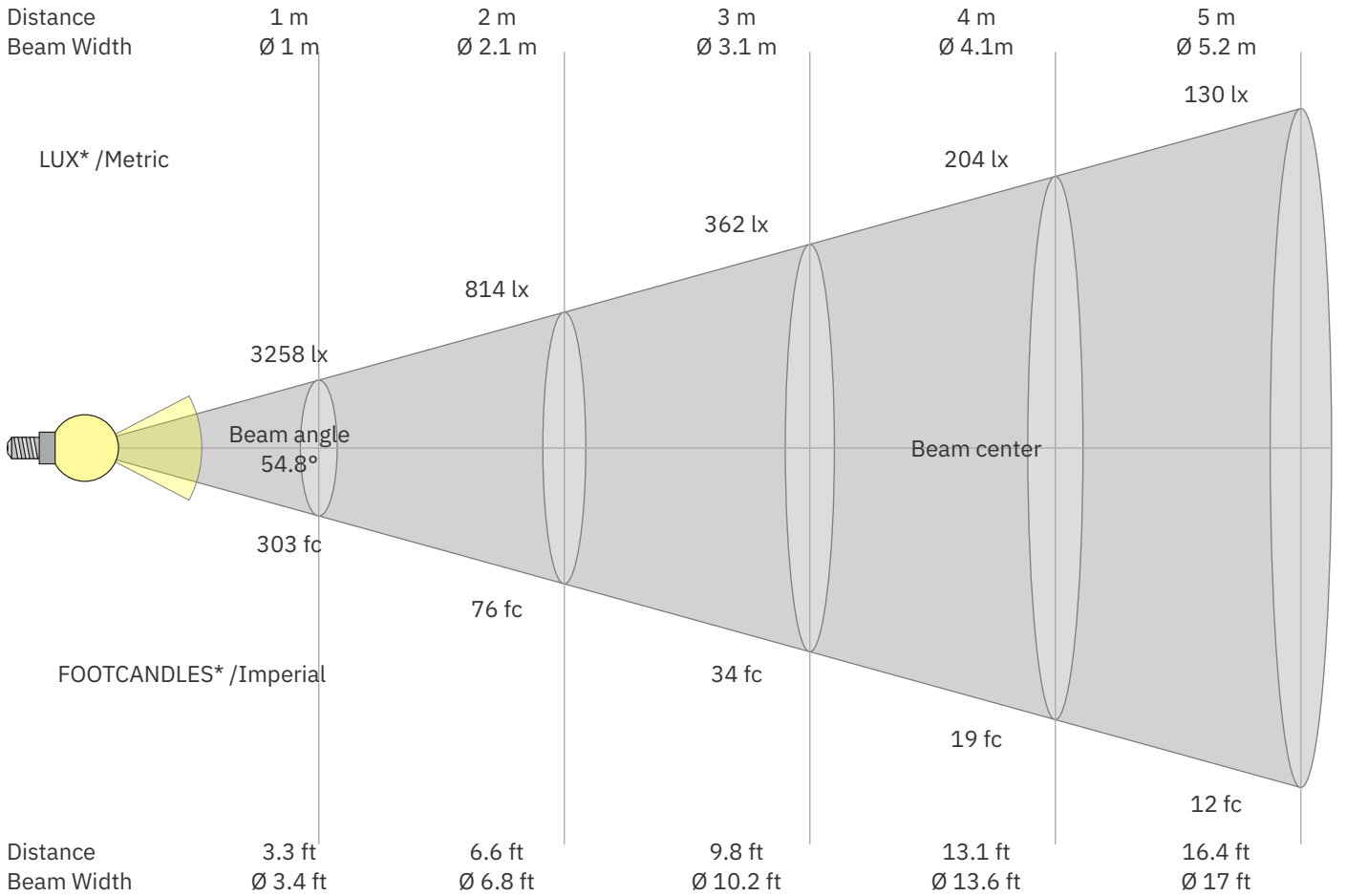


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Beam Details



*Measured at center of beam

Beam intensities from 1 – 20 m

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	m
3.3	6.6	9.8	13.1	16.4	19.7	23	26.2	29.5	32.8	36.1	39.4	42.7	45.9	49.2	52.5	55.8	59.1	62.3	65.6	ft
3258	814	362	204	130	90	66	51	40	33	27	23	19	17	14	13	11	10	9	8	lux
302.7	75.7	33.6	18.9	12.1	8.4	6.2	4.7	3.7	3	2.5	2.1	1.8	1.5	1.3	1.2	1	0.9	0.8	0.8	fc

Intensities in 0° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
3258	3254	3234	3190	3118	3054	2977	2889	2791	2673	2520	2337	2123	1857	1538	1273	1100	964	844	734	cd
100%	100%	99%	98%	96%	94%	91%	89%	86%	82%	77%	72%	65%	57%	47%	39%	34%	30%	26%	23%	of 0°val

Intensities in 90° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
3258	3254	3234	3190	3118	3054	2977	2889	2791	2673	2520	2337	2123	1857	1538	1273	1100	964	844	734	cd
100%	100%	99%	98%	96%	94%	91%	89%	86%	82%	77%	72%	65%	57%	47%	39%	34%	30%	26%	23%	of 0°val

Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
3258	3254	3234	3190	3118	3054	2977	2889	2791	2673	2520	2337	2123	1857	1538	1273	1100	964	844	734	cd
100%	100%	99%	98%	96%	94%	91%	89%	86%	82%	77%	72%	65%	57%	47%	39%	34%	30%	26%	23%	of 0°val

Intensities in 270° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
3258	3254	3234	3190	3118	3054	2977	2889	2791	2673	2520	2337	2123	1857	1538	1273	1100	964	844	734	cd
100%	100%	99%	98%	96%	94%	91%	89%	86%	82%	77%	72%	65%	57%	47%	39%	34%	30%	26%	23%	of 0°val

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Light Planning – UGR table

Uncorrected, comprehensive UGR table according to CIE 117-1995

Reflectances		70	70	50	50	30	70	70	50	50	30
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	18.3	19.0	18.4	19.2	19.4	18.3	19.0	18.4	19.2	19.4
	3H	18.0	18.8	18.4	19.0	19.2	18.0	18.8	18.4	19.0	19.2
	4H	17.9	18.7	18.3	18.9	19.2	17.9	18.7	18.3	18.9	19.2
	6H	17.9	18.6	18.2	18.9	19.2	17.9	18.6	18.2	18.9	19.2
	8H	17.9	18.5	18.2	18.8	19.2	17.9	18.5	18.2	18.8	19.2
	12H	17.8	18.4	18.2	18.8	19.2	17.8	18.4	18.2	18.8	19.2
4H	2H	17.9	18.7	18.3	19.0	19.2	17.9	18.7	18.3	19.0	19.2
	3H	17.8	18.4	18.2	18.8	19.2	17.8	18.4	18.2	18.8	19.2
	4H	17.7	18.2	18.1	18.7	19.2	17.7	18.2	18.1	18.7	19.2
	6H	17.6	18.2	18.1	18.5	18.9	17.6	18.2	18.1	18.5	18.9
	8H	17.6	18.1	18.1	18.4	18.8	17.6	18.1	18.1	18.4	18.8
	12H	17.5	17.9	18.0	18.3	18.8	17.5	17.9	18.0	18.3	18.8
8H	4H	17.6	18.1	18.1	18.4	18.8	17.6	18.1	18.1	18.4	18.8
	6H	17.5	17.9	18.0	18.3	18.8	17.5	17.9	18.0	18.3	18.8
	8H	17.5	17.8	18.0	18.3	18.9	17.5	17.8	18.0	18.3	18.9
	12H	17.4	17.7	18.0	18.2	18.8	17.4	17.7	18.0	18.2	18.8
12H	4H	17.5	17.9	18.0	18.3	18.8	17.5	17.9	18.0	18.3	18.8
	6H	17.5	17.8	18.0	18.3	18.9	17.5	17.8	18.0	18.3	18.9
	8H	17.4	17.7	18.0	18.2	18.8	17.4	17.7	18.0	18.2	18.8

Variations with the observer position for the luminaire spacings. S:

S = 1.0H	2.7 / -7.7	2.7 / -7.7
S = 1.5H	5.0 / -18.5	5.0 / -18.5
S = 2.0H	6.9 / -18.8	6.9 / -18.8

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	119	119	119	119	116	116	116	116	111	111	106	106	106	102	102	102	100	
1	113	110	108	106	111	108	106	104	104	102	101	101	99	98	97	96	95	93
2	108	102	98	95	105	101	97	94	98	94	92	95	92	90	92	90	88	86
3	102	95	90	86	100	94	89	85	91	87	84	89	85	83	86	84	81	80
4	96	89	83	79	95	87	82	78	85	81	77	83	79	76	81	78	75	74
5	91	83	77	72	90	82	76	72	80	75	71	78	74	71	77	73	70	68
6	87	77	71	67	85	77	71	67	75	70	66	74	69	66	72	68	65	64
7	82	73	66	62	81	72	66	62	71	65	61	69	65	61	68	64	61	59
8	78	68	62	58	77	68	62	58	66	61	57	65	61	57	64	60	57	55
9	74	64	58	54	73	64	58	54	63	57	54	62	57	54	61	57	53	52
10	71	61	55	51	70	60	55	51	59	54	51	59	54	50	58	53	50	49