



PHOTOMETRIC LIGHT REPORT

**Refl downl | white |
Ø228mm | 60° | 3-CCT |
6~15W | EU plug**

Article number: 136-445



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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 136-445. 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 136-445 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 136-445 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	Vitretek 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	13.4 W – PF 0.96 – DPF 0.97
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 2 sec – +0.2%

Tested light source

Manufacturer and Order Code	Tronix Lighting – 136-445
Product Description	Refl downl white Ø228mm 60° 3-CCT 6~15W EU plug

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	1460 lm – 0% / 100%
Efficiency	109 lm/W
Energy efficiency class	E
Peak Intensity and Beam Angle	1613 cd – 54.9°
Correlated Colour Temperature	CCT = 4156 K
Colour Shift. CIE duv	Duv -0.0054
Colour Rendering Index	CRI 87.0
Colour Rendering TM30-18	R _f 84.1 – R _g 95.0
Television Lighting Consistency Index	TLCI = 75
Flicker	SVM 0.01 – PstLM 0.19



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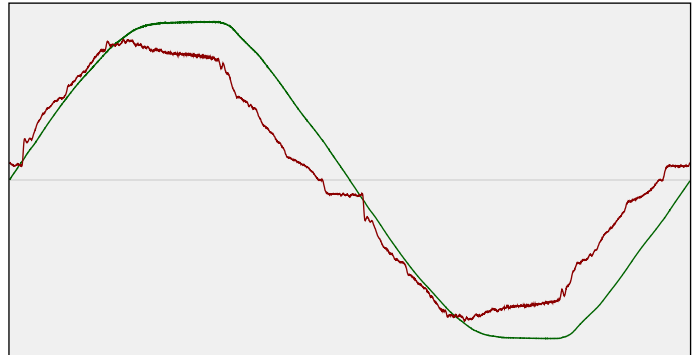
Electrical measurement details

Input Power

RMS Input voltage feed. V_{RMS}	230 V
RMS Input current feed. I_{RMS}	0.060 A
Total input power	13.4 W
Frequency of input power	50 Hz
Power factor	0.96
Displacement power factor	0.97
Total harmonic distortion of the current	10.45%
Total harmonic distortion of the voltage	2.46%

Input Power Curve

Voltage - Current



Efficiency

Radiated power efficiency: 34.6%



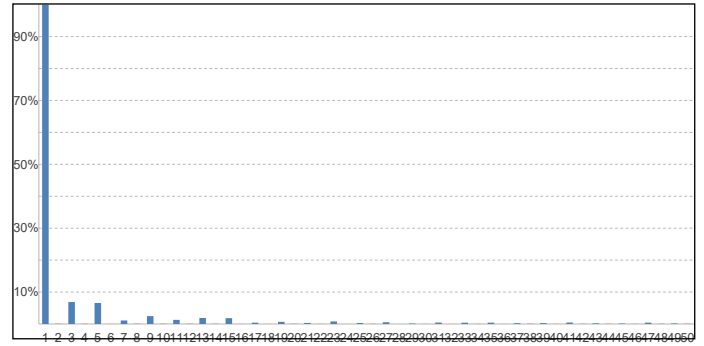
Lumen efficiency: 109 lm/W



Harmonics

3rd Harmonic	6.87%
5th Harmonic	6.57%
7th Harmonic	1.1%
9th Harmonic	2.46%
11th Harmonic	1.29%

Current Harmonics %



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	4152 K
CCT shift	+4 K
CCT end	4156 K

Warm-up Results

Total warmup time	Lamp stabilized in 15 min 2 sec
Warmup variation	+0.2%

Output intensity change during warm-up

Output start	1458 lm
Output change	+2 lm
Output end	1460 lm



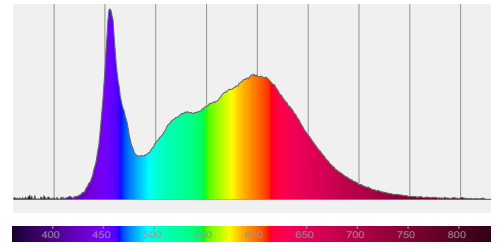
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Colour measurement details

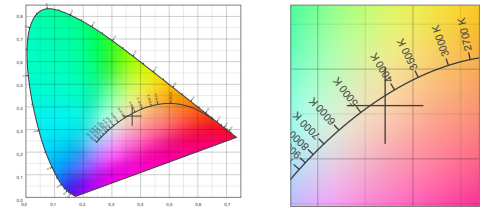
Total lumen output 1460 lm
 Correlated Colour Temperature 4156 K
 Colour coordinates CIE 1931 (x;y) = (0.371;0.359)
 Colour deviation from BBL Duv = -0.0054

TM30-18 Colour Fidelity Index R_f 84.1
 TM30-18 Colour Gamut Index R_g 95.0
 Colour Rendering Index (Ra) CRI 87.0
 Colour Rendering Index. (red component) $R_9 = 28.2$

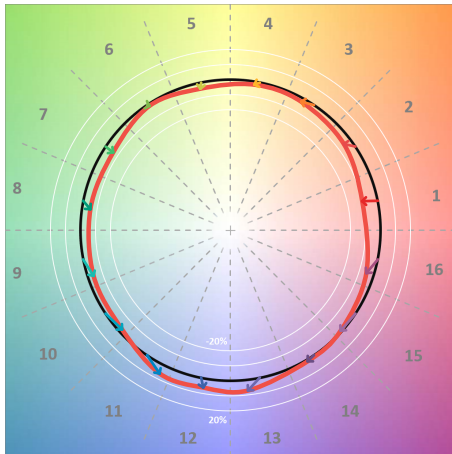
Colour Quality Scale CQS = 83.5
 Television Lighting Consistency Index TLCI = 75



Relative spectral power distribution



TM30 details

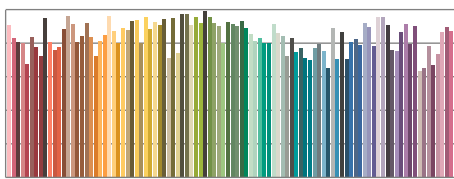


TM30 Colour vectors per hue bin

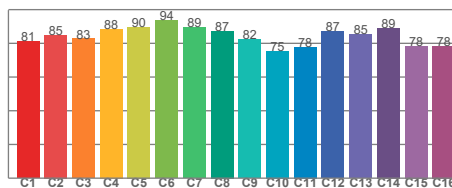


TM30 Colour distortion

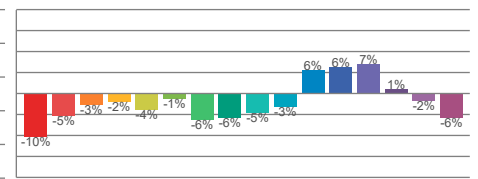
Hue Bin	R_f	Shifts (%)	
		Chroma	Hue
C1	81	-10%	2%
C2	85	-5%	6%
C3	83	-3%	8%
C4	88	-2%	3%
C5	90	-4%	1%
C6	94	-1%	-1%
C7	89	-6%	0%
C8	87	-6%	5%
C9	82	-5%	12%
C10	75	-3%	15%
C11	78	6%	14%
C12	87	6%	3%
C13	85	7%	-9%
C14	89	1%	-6%
C15	78	-2%	-15%
C16	78	-6%	-10%



TM30-18 R_f -values per reference colour

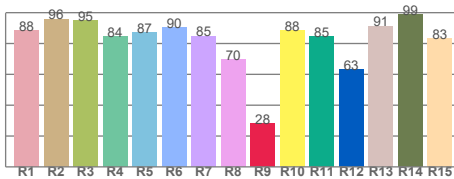


TM30-18 R_f -values per hue bin

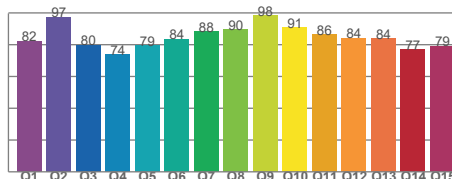


TM30 Chroma shift

Colour Quality details



Colour Rendering Index



Colour Quality Scale

Document revision date: 1-7-2025 Measurement serial: VFR-250130-1824-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)

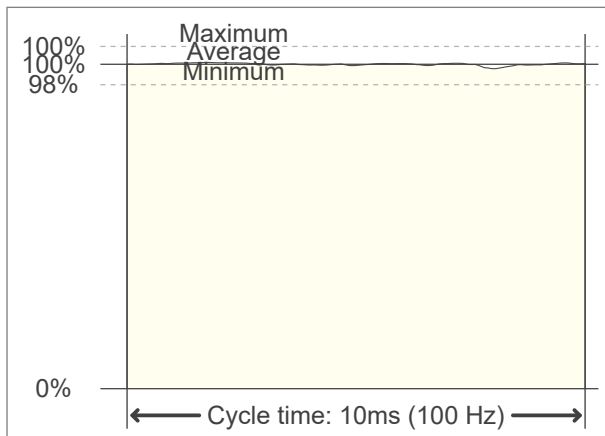
Flicker frequency	100 Hz
Percent flicker	1.73 %
Flicker index	0

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

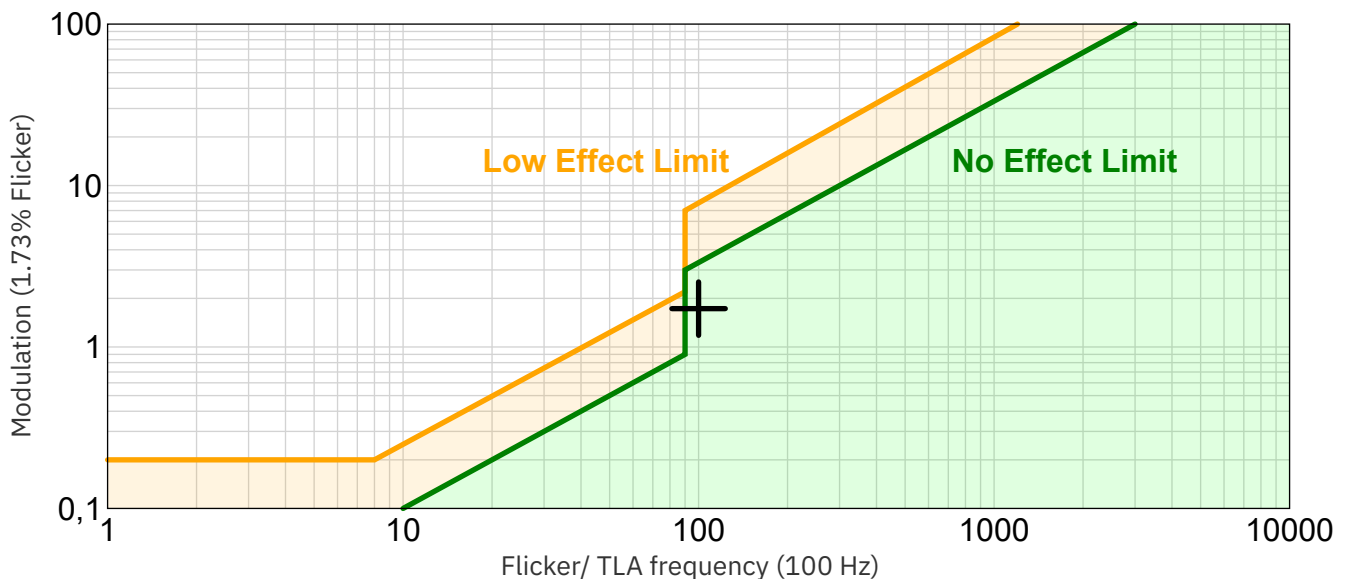
Flicker frame (one flicker period in time domain)



Flicker FFT (flicker curve in frequency domain)



IEEE 1789-2015 Lighting Flicker Risk Zones



Document revision date: 1-7-2025 Measurement serial: VFR-250130-1824-MS

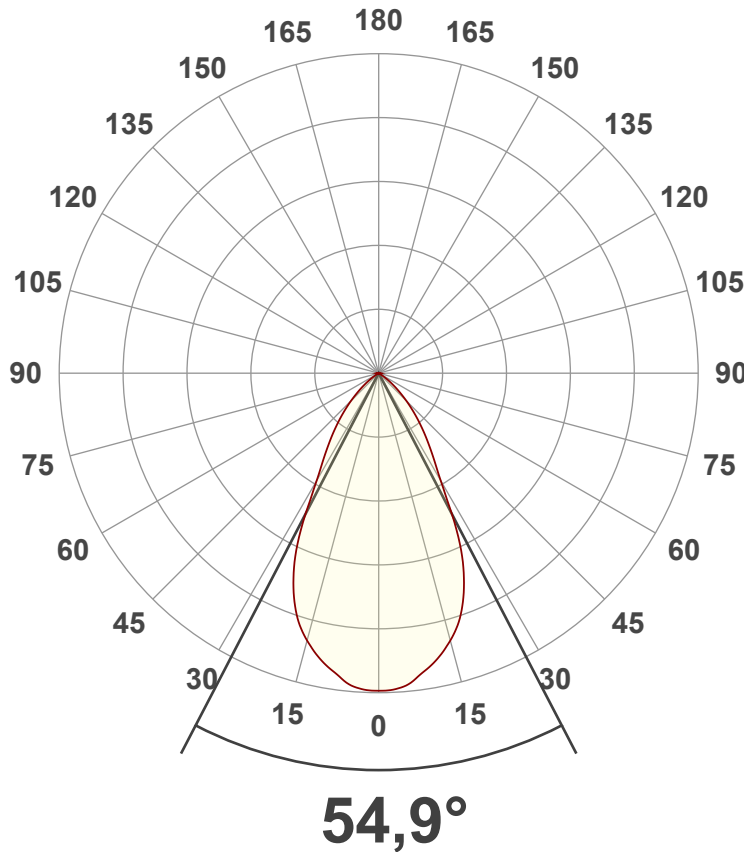


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Beam angle

Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1460 lm
Lumen Up/Down	0% / 100%
Peak Intensity	1613 cd
Beam Angle (50%)	54.9°
Beam Angle (90%)	54.9°
Beam Angle (10%)	54.9°

Cut-off Angle

Average 2.5%	110°
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Field Angle

Average 10%	93.8°
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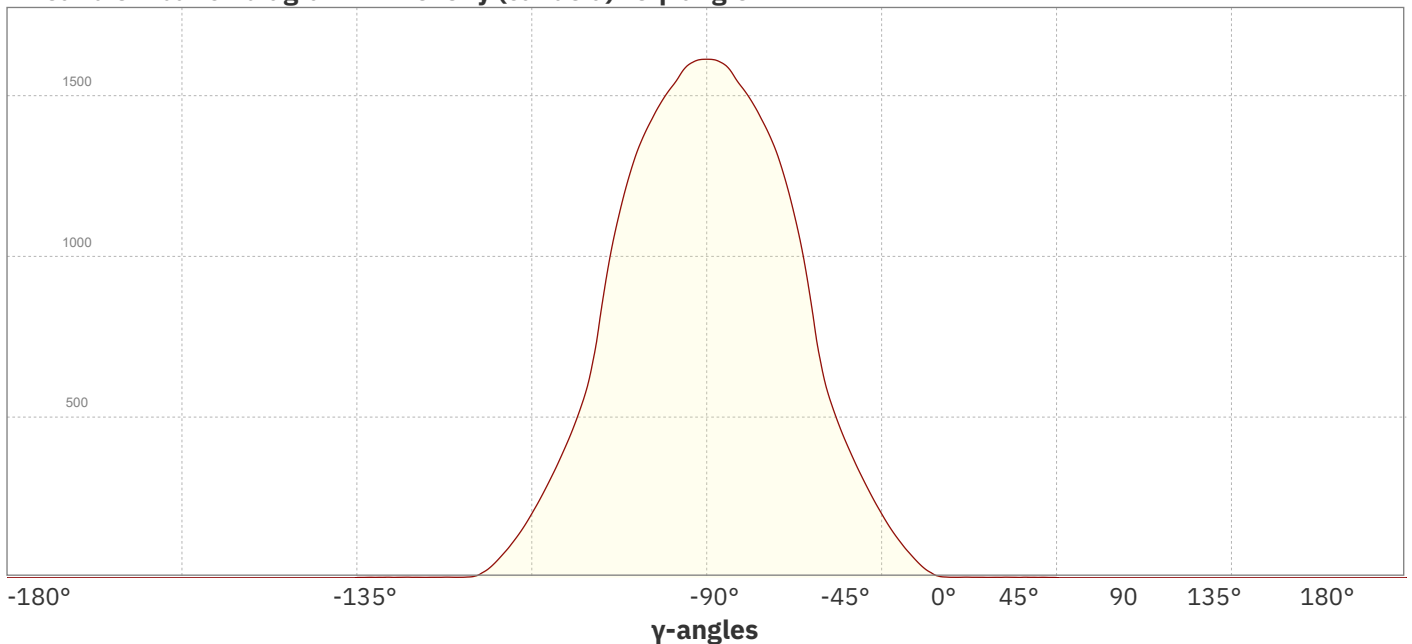
Intensity Ratio

In 120° cone	99.6%
In 90° cone	92.7%

C planes

- C000-C180
- C090-C270

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

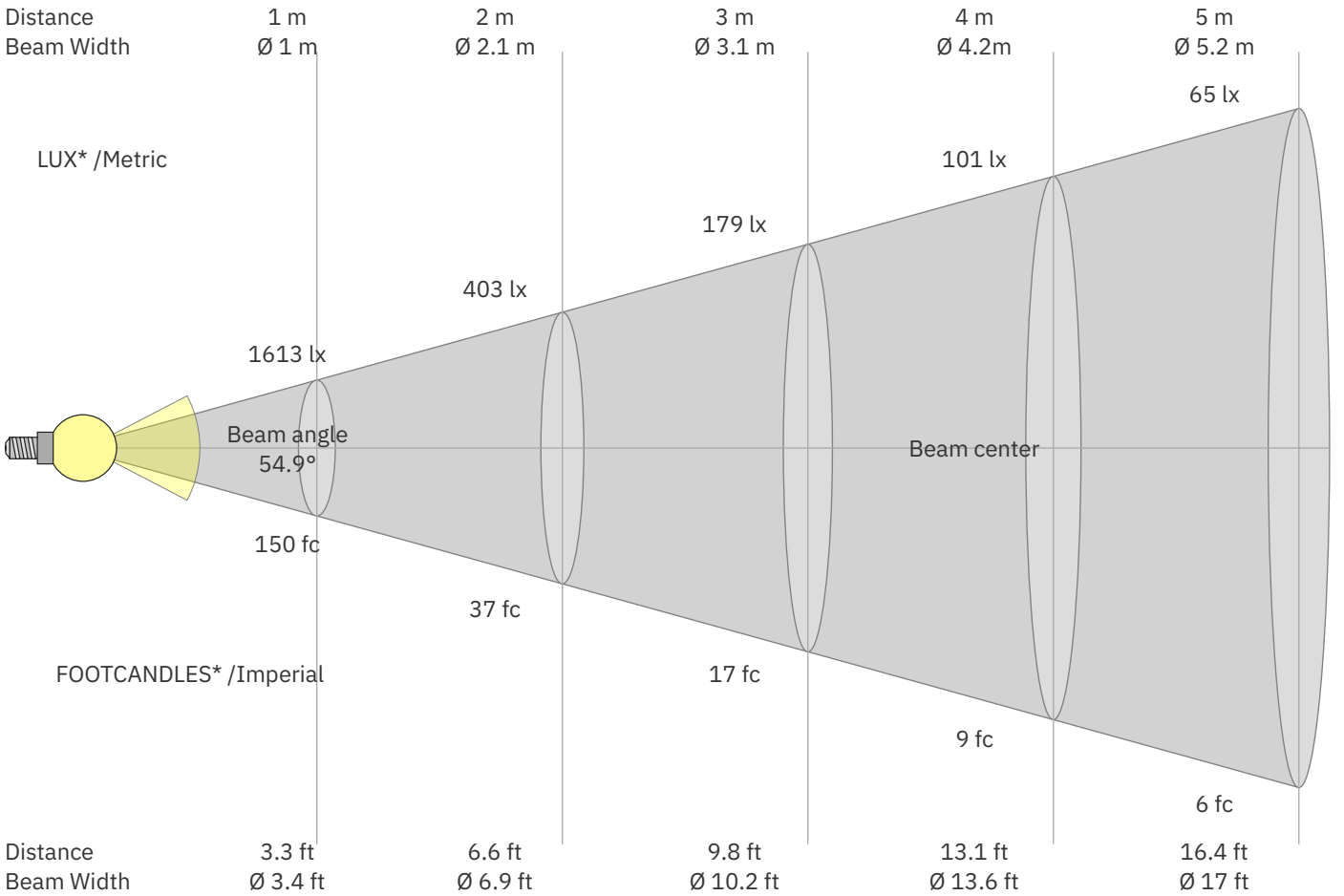


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Beam Details



*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
1613	403	179	101	65	45	33	25	20	16	13	11	10	8	7	6	6	5	4	4	lux
149.9	37.5	16.7	9.4	6	4.2	3.1	2.3	1.9	1.5	1.2	1	0.9	0.8	0.7	0.6	0.5	0.5	0.4	0.4	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
1613	1611	1601	1579	1543	1511	1473	1429	1381	1322	1247	1156	1050	919	761	631	544	476	417	363	cd
100%	100%	99%	98%	96%	94%	91%	89%	86%	82%	77%	72%	65%	57%	47%	39%	34%	30%	26%	22%	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
1613	1611	1601	1579	1543	1511	1473	1429	1381	1322	1247	1156	1050	919	761	631	544	476	417	363	cd
100%	100%	99%	98%	96%	94%	91%	89%	86%	82%	77%	72%	65%	57%	47%	39%	34%	30%	26%	22%	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
1613	1611	1601	1579	1543	1511	1473	1429	1381	1322	1247	1156	1050	919	761	631	544	476	417	363	cd
100%	100%	99%	98%	96%	94%	91%	89%	86%	82%	77%	72%	65%	57%	47%	39%	34%	30%	26%	22%	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
1613	1611	1601	1579	1543	1511	1473	1429	1381	1322	1247	1156	1050	919	761	631	544	476	417	363	cd
100%	100%	99%	98%	96%	94%	91%	89%	86%	82%	77%	72%	65%	57%	47%	39%	34%	30%	26%	22%	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	15.8	16.5	16.0	16.8	17.0	15.8	16.5	16.0	16.8	17.0
	3H	15.6	16.4	15.9	16.6	16.8	15.6	16.4	15.9	16.6	16.8
	4H	15.5	16.3	15.9	16.5	16.7	15.5	16.3	15.9	16.5	16.7
	6H	15.5	16.1	15.8	16.4	16.8	15.5	16.1	15.8	16.4	16.8
	8H	15.4	16.1	15.8	16.4	16.8	15.4	16.1	15.8	16.4	16.8
	12H	15.4	16.0	15.7	16.3	16.8	15.4	16.0	15.7	16.3	16.8
4H	2H	15.5	16.3	15.9	16.5	16.7	15.5	16.3	15.9	16.5	16.7
	3H	15.4	16.0	15.7	16.3	16.8	15.4	16.0	15.7	16.3	16.8
	4H	15.3	15.8	15.7	16.2	16.7	15.3	15.8	15.7	16.2	16.7
	6H	15.2	15.8	15.7	16.1	16.4	15.2	15.8	15.7	16.1	16.4
	8H	15.1	15.7	15.7	16.0	16.4	15.1	15.7	15.7	16.0	16.4
	12H	15.1	15.5	15.6	15.9	16.4	15.1	15.5	15.6	15.9	16.4
8H	4H	15.1	15.7	15.6	16.0	16.4	15.1	15.7	15.6	16.0	16.4
	6H	15.1	15.4	15.6	15.9	16.4	15.1	15.4	15.6	15.9	16.4
	8H	15.1	15.4	15.6	15.9	16.5	15.1	15.4	15.6	15.9	16.5
	12H	15.0	15.3	15.6	15.8	16.4	15.0	15.3	15.6	15.8	16.4
12H	4H	15.1	15.5	15.6	15.9	16.4	15.1	15.5	15.6	15.9	16.4
	6H	15.1	15.4	15.6	15.9	16.5	15.1	15.4	15.6	15.9	16.5
	8H	15.0	15.3	15.6	15.8	16.4	15.0	15.3	15.6	15.8	16.4

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

S = 1.0H	2.6 / -7.0	2.6 / -7.0
S = 1.5H	4.9 / -12.6	4.9 / -12.6
S = 2.0H	6.8 / -13.0	6.8 / -13.0

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	0	
Floor reflectance	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	100
1	113	110	108	106	111	108	106	104	104	102	101	100	99	98	97	96
2	107	102	98	95	105	101	97	94	97	94	92	94	92	90	92	90
3	102	95	90	86	100	94	89	85	91	87	84	89	85	82	86	84
4	96	89	83	78	95	87	82	78	85	81	77	83	79	76	81	78
5	91	83	77	72	90	82	76	72	80	75	71	78	74	70	77	73
6	86	77	71	67	85	76	71	66	75	70	66	73	69	65	72	68
7	82	72	66	62	81	72	66	62	70	65	61	69	65	61	68	64
8	78	68	62	58	77	67	62	58	66	61	57	65	61	57	64	60
9	74	64	58	54	73	64	58	54	63	57	54	62	57	53	61	56
10	71	61	55	51	69	60	54	51	59	54	50	58	54	50	58	53