



## PHOTOMETRIC LIGHT REPORT

**Spot | black | cut out Ø90-  
95mm | 9W | 2700K | dim**

**Article number: 136-191**



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Lighting



**TRONIX**



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## Introduction

### Purpose of this Document

This document provides accurate and objective photometric data for Tronix Lighting item 136-191. 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 136-191 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 136-191 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	9.0 W – PF 0.91 – DPF 0.98
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 22 min 46 sec --5.6%

### Tested light source

Manufacturer and Order Code	Tronix Lighting – 136-191
Product Description	Spot   black   cut out Ø90-95mm   9W   2700K   dim

### Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	690 lm – 0.1% / 99.9%
Efficiency	76 lm/W
Energy efficiency class	G
Peak Intensity and Beam Angle	1056 cd – 42.9°
Correlated Colour Temperature	CCT = 2736 K
Colour Shift. CIE duv	Duv 0.0004
Colour Rendering Index	CRI 82.7
Colour Rendering TM30-18	R <sub>f</sub> 85.4 – R <sub>g</sub> 95.0
Television Lighting Consistency Index	TLCI = 70
Flicker	SVM 0.02 – PstLM 0.21



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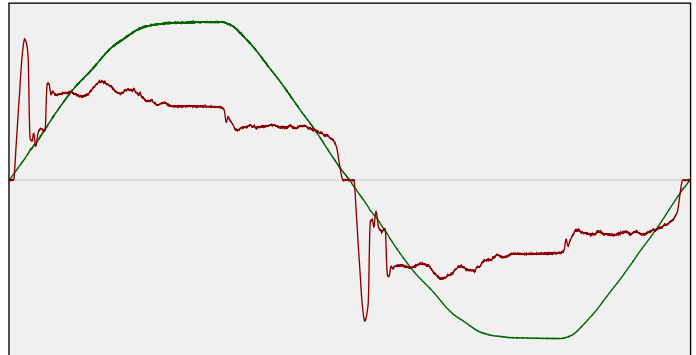
Electrical measurement details

**Input Power**

RMS Input voltage feed.  $V_{RMS}$  231 V  
 RMS Input current feed.  $I_{RMS}$  0.043 A  
 Total input power 9.0 W  
 Frequency of input power 50 Hz  
 Power factor 0.91  
 Displacement power factor 0.98  
 Total harmonic distortion of the current 37.8%  
 Total harmonic distortion of the voltage 3%

Input Power Curve

Voltage - Current



**Efficiency**

Radiated power efficiency: 23.7%



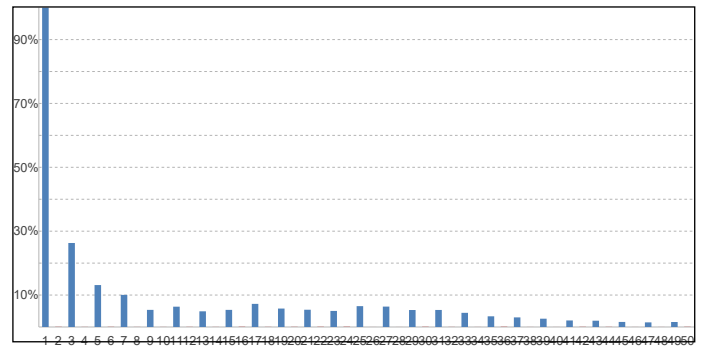
Lumen efficiency: 76 lm/W



**Harmonics**

3rd Harmonic 26.3%  
 5th Harmonic 13.13%  
 7th Harmonic 10.05%  
 9th Harmonic 5.36%  
 11th Harmonic 6.36%

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 2724 K  
 CCT shift +12 K  
 CCT end 2736 K

**Warm-up Results**

Total warmup time Lamp stabilized in 22 min 46 sec  
 Warmup variation -5.6%

**Output intensity change during warm-up**

Output start 729 lm  
 Output change -38 lm  
 Output end 690 lm



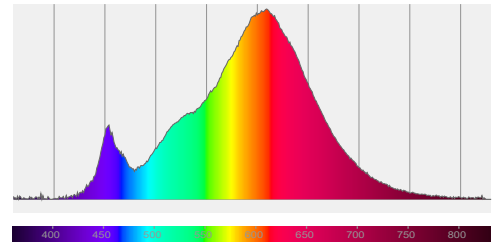
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## Colour measurement details

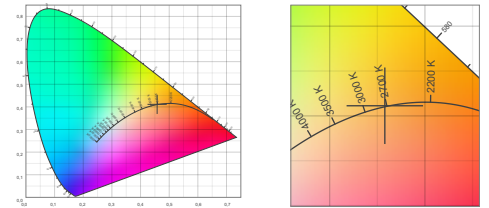
Total lumen output 690 lm  
 Correlated Colour Temperature 2736 K  
 Colour coordinates CIE 1931 (x;y) = (0.458;0.411)  
 Colour deviation from BBL Duv = 0.0004

TM30-18 Colour Fidelity Index R<sub>f</sub> 85.4  
 TM30-18 Colour Gamut Index R<sub>g</sub> 95.0  
 Colour Rendering Index (Ra) CRI 82.7  
 Colour Rendering Index. (red component) R9 = 7.8

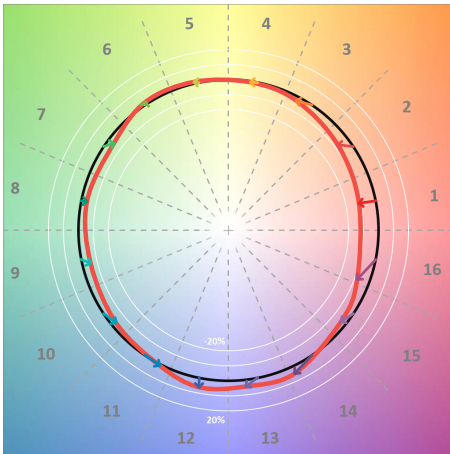
Colour Quality Scale CQS = 82.4  
 Television Lighting Consistency Index TLCI = 70



Relative spectral power distribution



## TM30 details

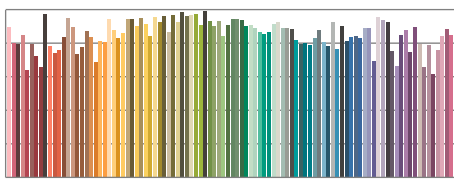


TM30 Colour vectors per hue bin

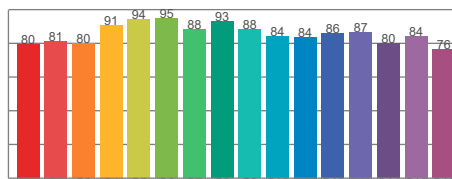


TM30 Colour distortion

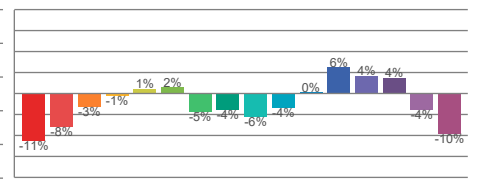
Hue Bin	R <sub>f</sub>	Shifts (%)	
		Chroma	Hue
C1	80	-11%	1%
C2	81	-8%	7%
C3	80	-3%	10%
C4	91	-1%	5%
C5	94	1%	3%
C6	95	2%	-1%
C7	88	-5%	-6%
C8	93	-4%	0%
C9	88	-6%	4%
C10	84	-4%	10%
C11	84	0%	12%
C12	86	6%	1%
C13	87	4%	-9%
C14	80	4%	-16%
C15	84	-4%	-9%
C16	76	-10%	-15%



TM30-18 R<sub>f</sub>-values per reference colour

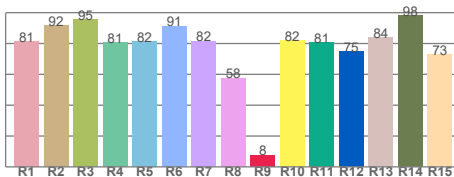


TM30-18 R<sub>f</sub>-values per hue bin

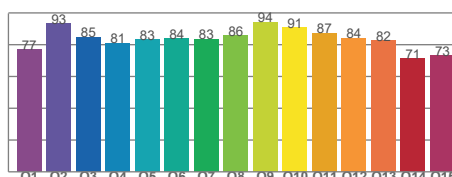


TM30 Chroma shift

## Colour Quality details



Colour Rendering Index



Colour Quality Scale

Document revision date: 1-7-2025 Measurement serial: VFR-250122-0820-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)**

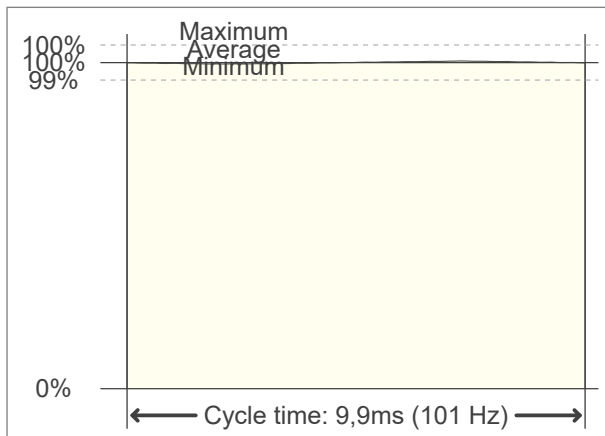
Flicker frequency	101.01 Hz
Percent flicker	0.76 %
Flicker index	0

**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  $\leq 0.4$  and if the PstLM value is  $\leq 1.0$

PstLM value (F < 80 Hz)	0.21
SVM value (80 < F < 2000 Hz)	0.02

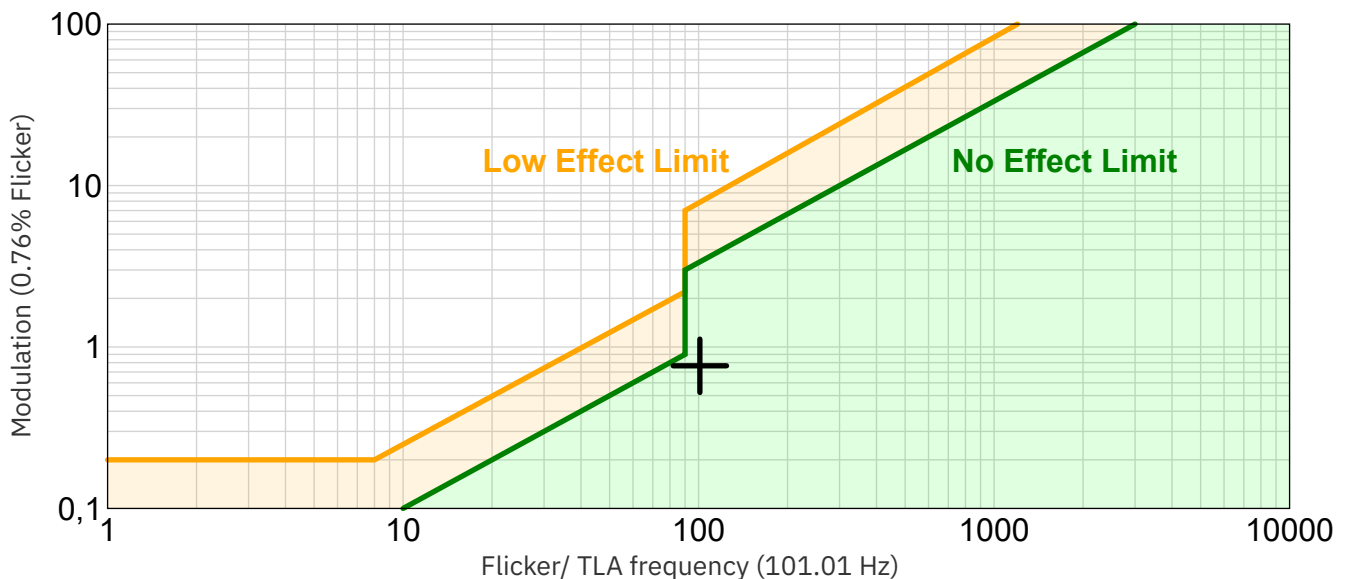
**Flicker frame (one flicker period in time domain)**



**Flicker FFT (flicker curve in frequency domain)**



**IEEE 1789-2015 Lighting Flicker Risk Zones**



Document revision date: 1-7-2025 Measurement serial: VFR-250122-0820-MS

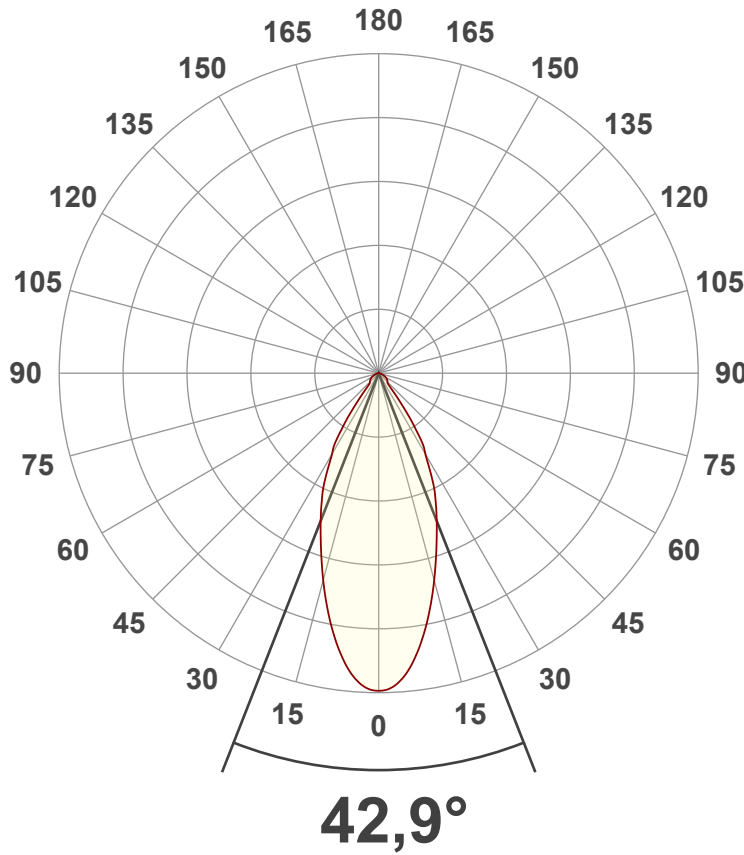


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Beam angle

**Luminous Intensity diagram**

Unit: 0-100% of peak intensity



**Main Values**

Output (total Lumen)	690 lm
Lumen Up/Down	0.1% / 99.9%
Peak Intensity	1056 cd
Beam Angle (50%)	42.9°
Beam Angle (90%)	42.9°
Beam Angle (10%)	42.9°

**Cut-off Angle**

Average 2.5%	120.1°
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**Field Angle**

Average 10%	74.6°
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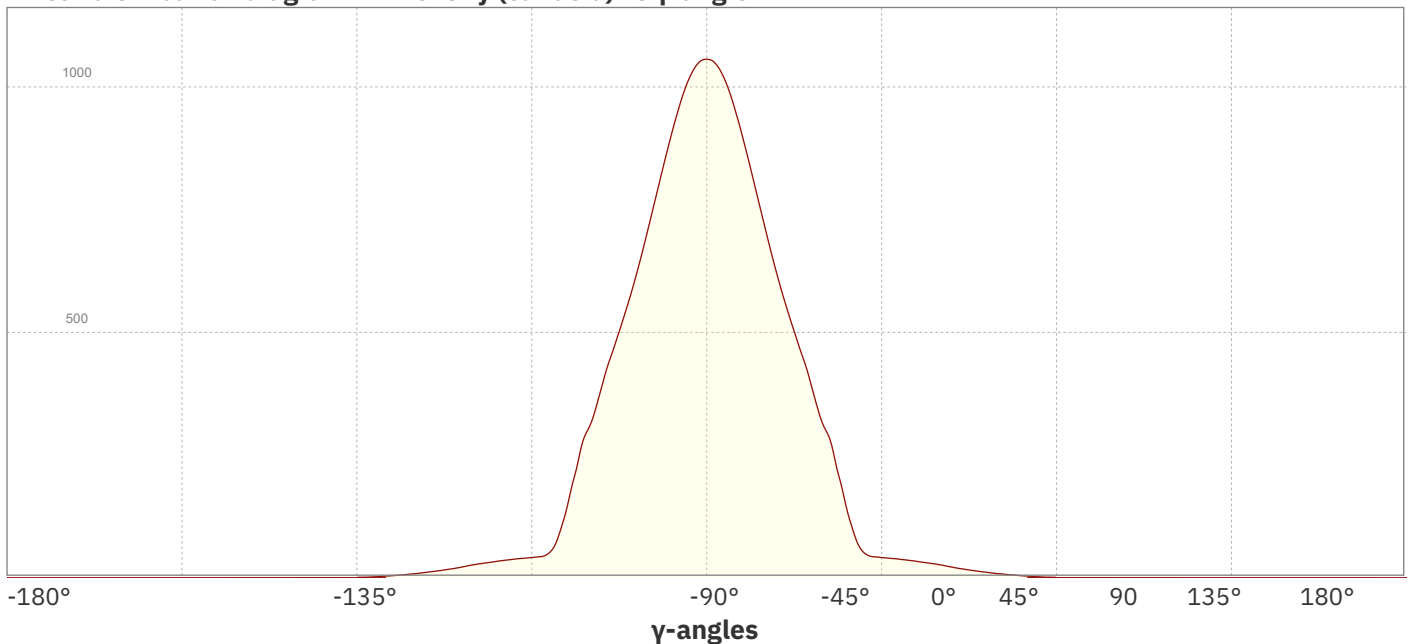
**Intensity Ratio**

In 120° cone	95.4%
In 90° cone	88.9%

**C planes**

- C000-C180
- C090-C270

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

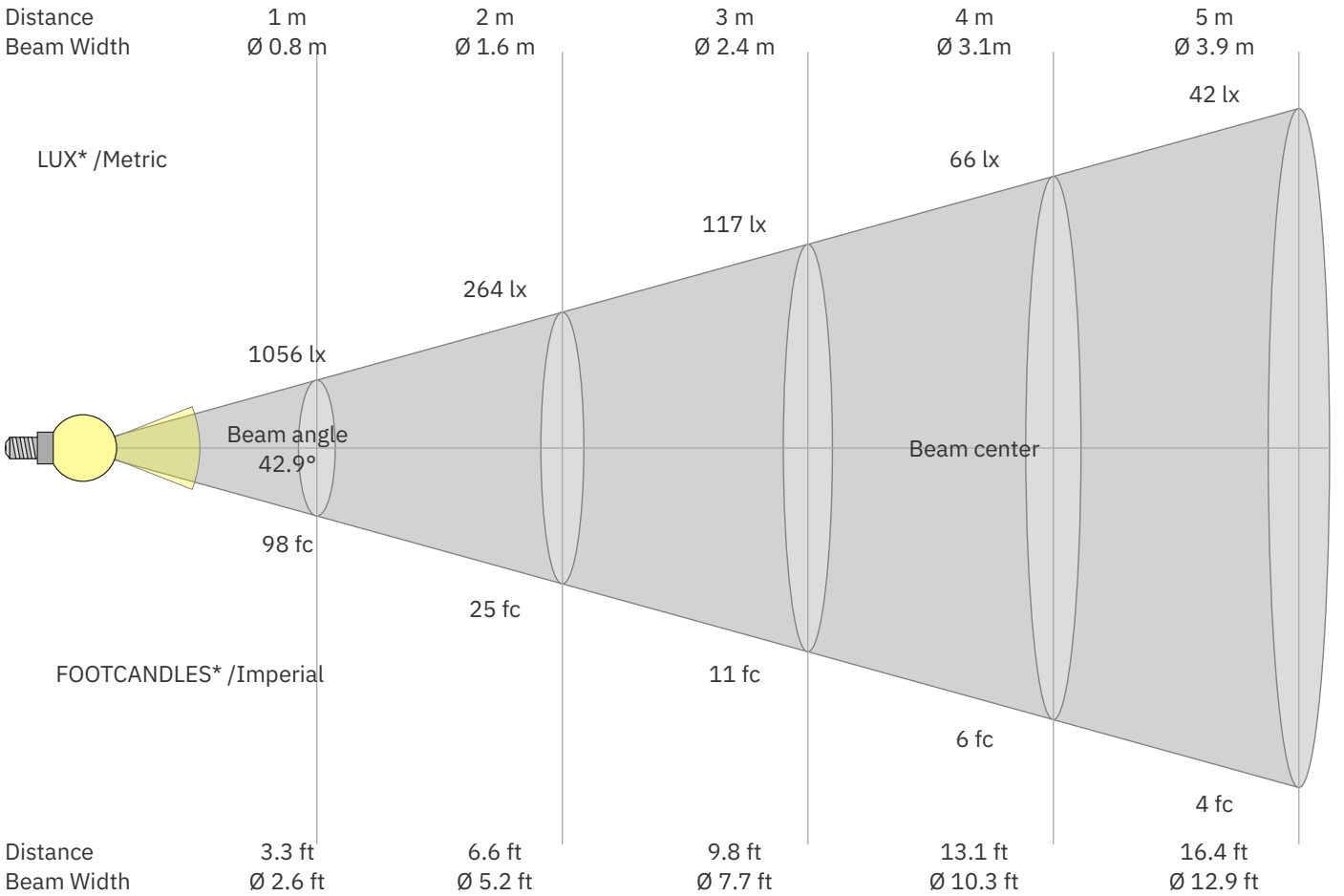


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Beam Details



\*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
1056	264	117	66	42	29	22	17	13	11	9	7	6	5	5	4	4	3	3	3	lux
98.1	24.5	10.9	6.1	3.9	2.7	2	1.5	1.2	1	0.8	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.3	0.2	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
1056	1050	1026	986	934	874	811	746	681	620	565	514	466	418	360	311	273	207	142	88	cd
100%	99%	97%	93%	88%	83%	77%	71%	64%	59%	53%	49%	44%	40%	34%	29%	26%	20%	13%	8%	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
1056	1050	1026	986	934	874	811	746	681	620	565	514	466	418	360	311	273	207	142	88	cd
100%	99%	97%	93%	88%	83%	77%	71%	64%	59%	53%	49%	44%	40%	34%	29%	26%	20%	13%	8%	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
1056	1050	1026	986	934	874	811	746	681	620	565	514	466	418	360	311	273	207	142	88	cd
100%	99%	97%	93%	88%	83%	77%	71%	64%	59%	53%	49%	44%	40%	34%	29%	26%	20%	13%	8%	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
1056	1050	1026	986	934	874	811	746	681	620	565	514	466	418	360	311	273	207	142	88	cd
100%	99%	97%	93%	88%	83%	77%	71%	64%	59%	53%	49%	44%	40%	34%	29%	26%	20%	13%	8%	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	17.6	18.3	17.8	18.6	18.7	17.6	18.3	17.8	18.6	18.7
	3H	18.2	19.0	18.5	19.2	19.4	18.2	19.0	18.5	19.2	19.4
	4H	18.4	19.2	18.8	19.4	19.7	18.4	19.2	18.8	19.4	19.7
	6H	18.7	19.3	19.0	19.6	20.0	18.7	19.3	19.0	19.6	20.0
	8H	18.7	19.3	19.0	19.7	20.0	18.7	19.3	19.0	19.7	20.0
	12H	18.7	19.3	19.1	19.7	20.1	18.7	19.3	19.1	19.7	20.1
4H	2H	17.8	18.6	18.2	18.8	19.0	17.8	18.6	18.2	18.8	19.0
	3H	18.7	19.3	19.0	19.6	20.1	18.7	19.3	19.0	19.6	20.1
	4H	19.0	19.5	19.4	20.0	20.5	19.0	19.5	19.4	20.0	20.5
	6H	19.2	19.8	19.7	20.1	20.5	19.2	19.8	19.7	20.1	20.5
	8H	19.3	19.8	19.8	20.2	20.6	19.3	19.8	19.8	20.2	20.6
	12H	19.3	19.8	19.8	20.2	20.6	19.3	19.8	19.8	20.2	20.6
8H	4H	19.1	19.6	19.6	19.9	20.3	19.1	19.6	19.6	19.9	20.3
	6H	19.4	19.8	19.9	20.3	20.8	19.4	19.8	19.9	20.3	20.8
	8H	19.6	19.9	20.1	20.4	21.1	19.6	19.9	20.1	20.4	21.1
	12H	19.7	19.9	20.3	20.4	21.1	19.7	19.9	20.3	20.4	21.1
12H	4H	19.0	19.5	19.5	19.9	20.3	19.0	19.5	19.5	19.9	20.3
	6H	19.5	19.8	20.0	20.3	20.9	19.5	19.8	20.0	20.3	20.9
	8H	19.6	19.9	20.2	20.4	21.0	19.6	19.9	20.2	20.4	21.0

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

S = 1.0H	2.1 / -0.8	2.1 / -0.8
S = 1.5H	3.9 / -1.0	3.9 / -1.0
S = 2.0H	5.5 / -1.6	5.5 / -1.6

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	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94	92
2	107	102	97	94	105	100	96	93	97	93	91	94	91	89	91	89	87	85
3	101	95	89	85	99	93	88	84	90	86	83	88	85	82	86	83	80	79
4	96	88	82	78	94	87	82	78	85	80	77	83	79	76	81	78	75	73
5	91	83	77	72	90	82	76	72	80	75	71	78	74	71	77	73	70	68
6	87	78	72	67	85	77	71	67	75	70	66	74	69	66	73	69	66	64
7	83	73	67	63	81	73	67	63	71	66	62	70	65	62	69	65	62	60
8	79	69	63	59	78	69	63	59	68	62	59	67	62	58	66	61	58	57
9	75	66	60	56	74	65	59	56	64	59	55	63	59	55	62	58	55	54
10	72	62	57	53	71	62	56	53	61	56	52	60	56	52	60	55	52	51