



## PHOTOMETRIC LIGHT REPORT

# Refl downl matt | Ø228mm | black | 3-CCT | 13~25W | GST18i3

Article number: 136-398



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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 136-398. 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 136-398 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 136-398 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	23.0 W – PF 0.97 – DPF 0.97
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 15 min 1 sec --0.1%

### Tested light source

Manufacturer and Order Code	Tronix Lighting – 136-398
Product Description	Refl downl matt   Ø228mm   black   3-CCT   13~25W   GST18i3

### Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	3004 lm – 0% / 100%
Efficiency	131 lm/W
Energy efficiency class	E
Peak Intensity and Beam Angle	2789 cd – 58.1°
Correlated Colour Temperature	CCT = 4223 K
Colour Shift. CIE duv	Duv -0.0047
Colour Rendering Index	CRI 87.1
Colour Rendering TM30-18	R <sub>f</sub> 85.3 – R <sub>g</sub> 97.5
Television Lighting Consistency Index	TLCI = 74
Flicker	SVM 0 – PstLM 0.02



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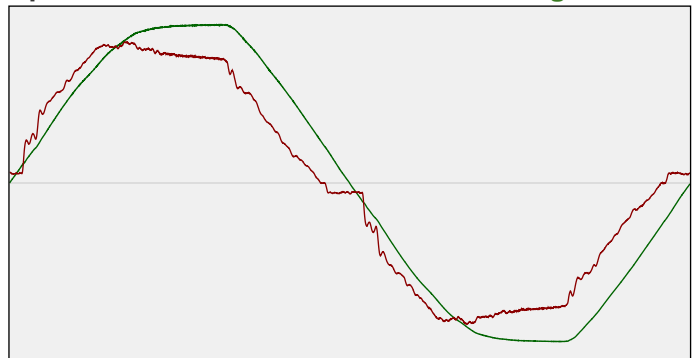
Electrical measurement details

**Input Power**

RMS Input voltage feed. $V_{RMS}$	233 V
RMS Input current feed. $I_{RMS}$	0.102 A
Total input power	23.0 W
Frequency of input power	50 Hz
Power factor	0.97
Displacement power factor	0.97
Total harmonic distortion of the current	10.16%
Total harmonic distortion of the voltage	3.1%

Input Power Curve

Voltage - Current



**Efficiency**

Radiated power efficiency: 41.2%



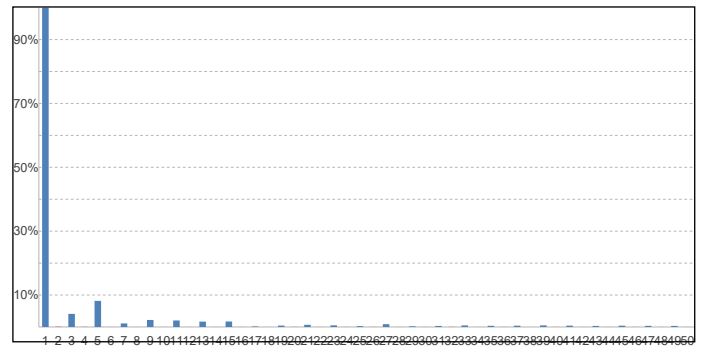
Lumen efficiency: 131 lm/W



**Harmonics**

3rd Harmonic	4.1%
5th Harmonic	8.18%
7th Harmonic	1.12%
9th Harmonic	2.2%
11th Harmonic	2.04%

Current Harmonics %



Stabilization Details

**Warm-up Conditions**

Stable period	15 min	CCT start	4212 K
Stable change max	2.0%	CCT shift	+11 K
Minimum warm-up time	15 min	CCT end	4223 K

**Colour temperature change during warm-up**

**Warm-up Results**

Total warmup time	Lamp stabilized in 15 min 1 sec	Output start	3006 lm
Warmup variation	-0.1%	Output change	-1 lm
		Output end	3004 lm

**Output intensity change during warm-up**



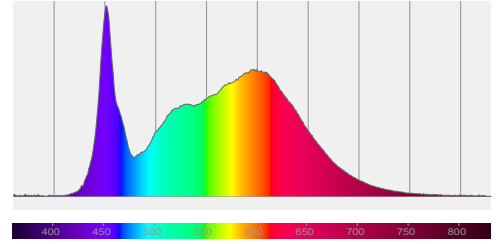
136-398 Refl downl matt | Ø228mm | black | 3-CCT | 13~25W | GST18i3

Colour measurement details

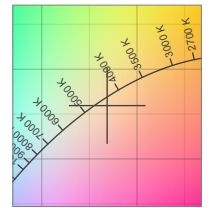
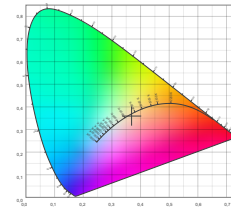
Total lumen output 3004 lm  
 Correlated Colour Temperature 4223 K  
 Colour coordinates CIE 1931 (x;y) = (0.369;0.359)  
 Colour deviation from BBL Duv = -0.0047

TM30-18 Colour Fidelity Index R<sub>f</sub> 85.3  
 TM30-18 Colour Gamut Index R<sub>g</sub> 97.5  
 Colour Rendering Index (Ra) CRI 87.1  
 Colour Rendering Index. (red component) R9 = 26.3

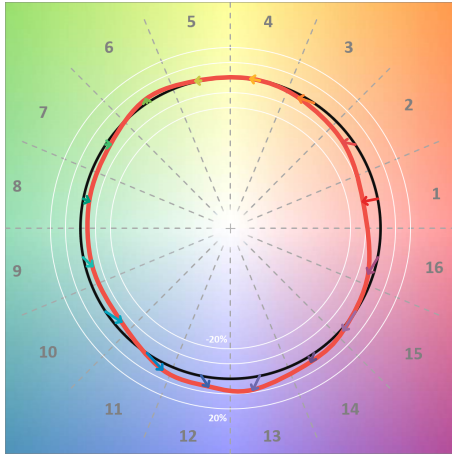
Colour Quality Scale CQS = 84.0  
 Television Lighting Consistency Index TLCI = 74



Relative spectral power distribution



TM30 details

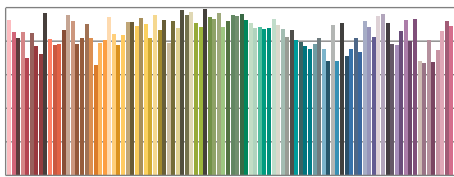


TM30 Colour vectors per hue bin

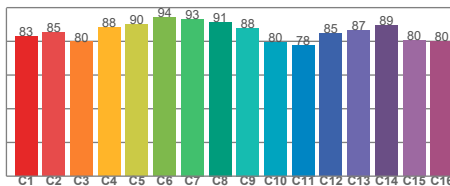


TM30 Colour distortion

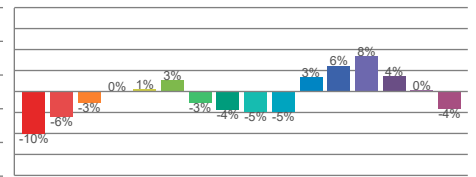
Hue Bin	R <sub>f</sub>	Shifts (%)	
		Chroma	Hue
C1	83	-10%	0%
C2	85	-6%	6%
C3	80	-3%	10%
C4	88	0%	6%
C5	90	1%	4%
C6	94	3%	-1%
C7	93	-3%	-2%
C8	91	-4%	1%
C9	88	-5%	7%
C10	80	-5%	11%
C11	78	3%	14%
C12	85	6%	6%
C13	87	8%	-6%
C14	89	4%	-5%
C15	80	0%	-15%
C16	80	-4%	-12%



TM30-18 Rf-values per reference colour

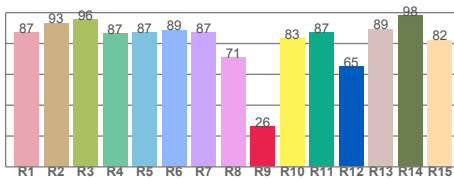


TM30-18 Rf-values per hue bin

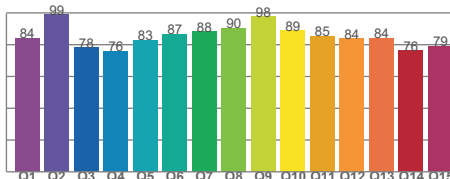


TM30 Chroma shift

Colour Quality details



Colour Rendering Index



Colour Quality Scale

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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)**

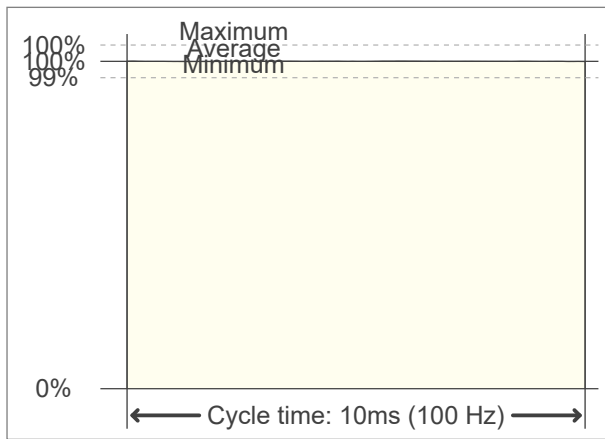
Flicker frequency	100 Hz
Percent flicker	0.21 %
Flicker index	0

**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)	0.02
SVM value (80 < F < 2000 Hz)	0

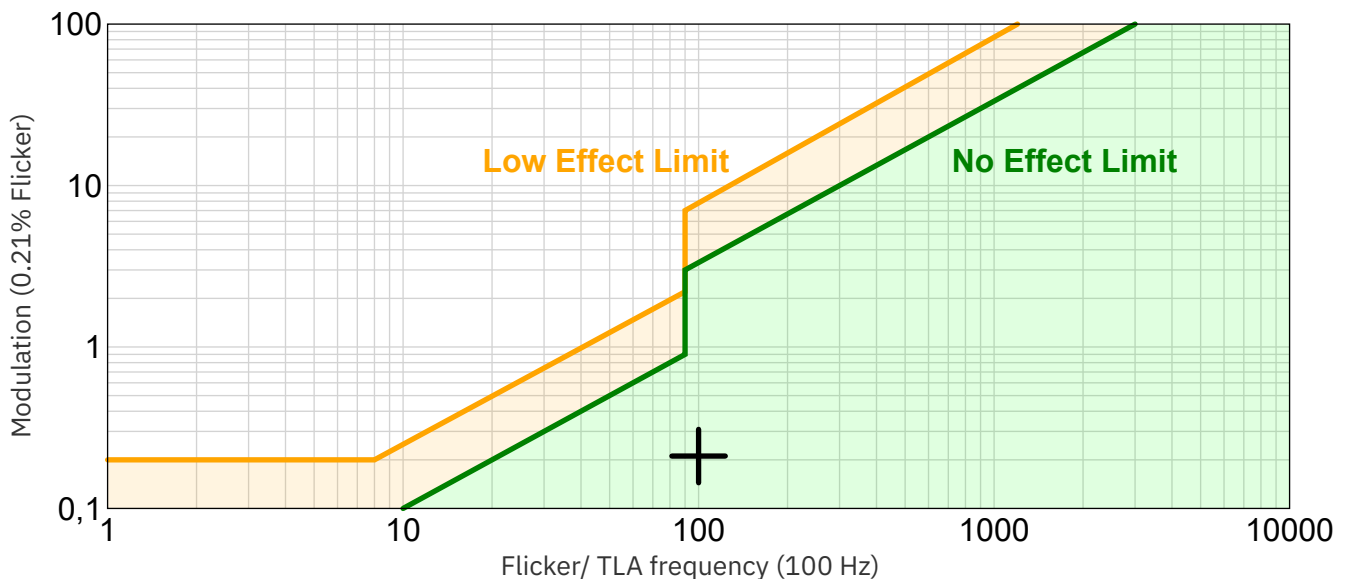
**Flicker frame (one flicker period in time domain)**



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



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



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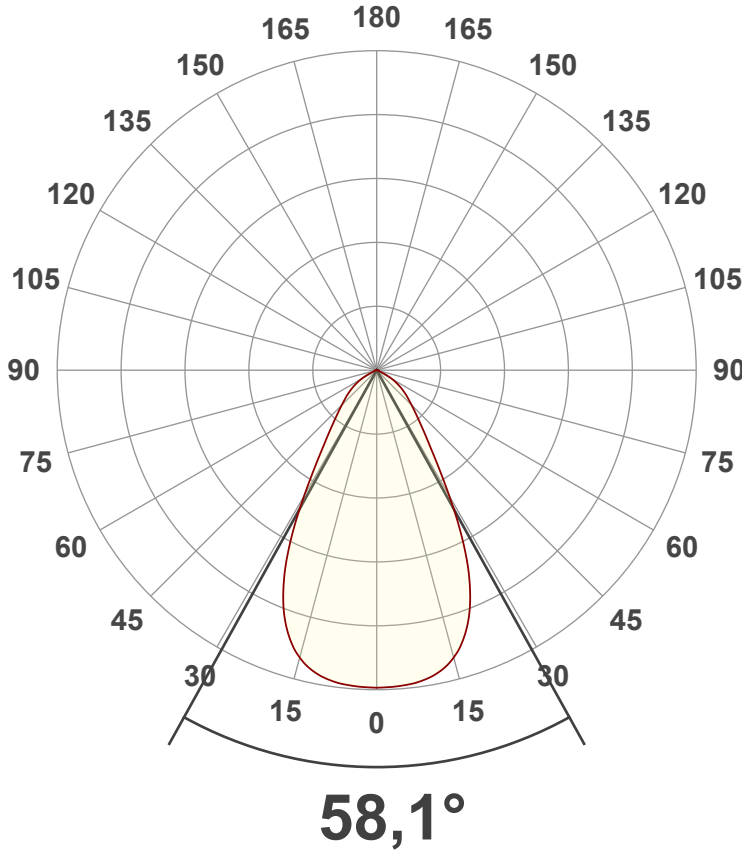


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Beam angle

**Luminous Intensity diagram**

Unit: 0-100% of peak intensity



**Main Values**

Output (total Lumen)	3004 lm
Lumen Up/Down	0% / 100%
Peak Intensity	2789 cd
Beam Angle (50%)	58.1°
Beam Angle (90%)	58.1°
Beam Angle (10%)	58.1°

**Cut-off Angle**

Average 2.5%	128.6°
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**Field Angle**

Average 10%	106.3°
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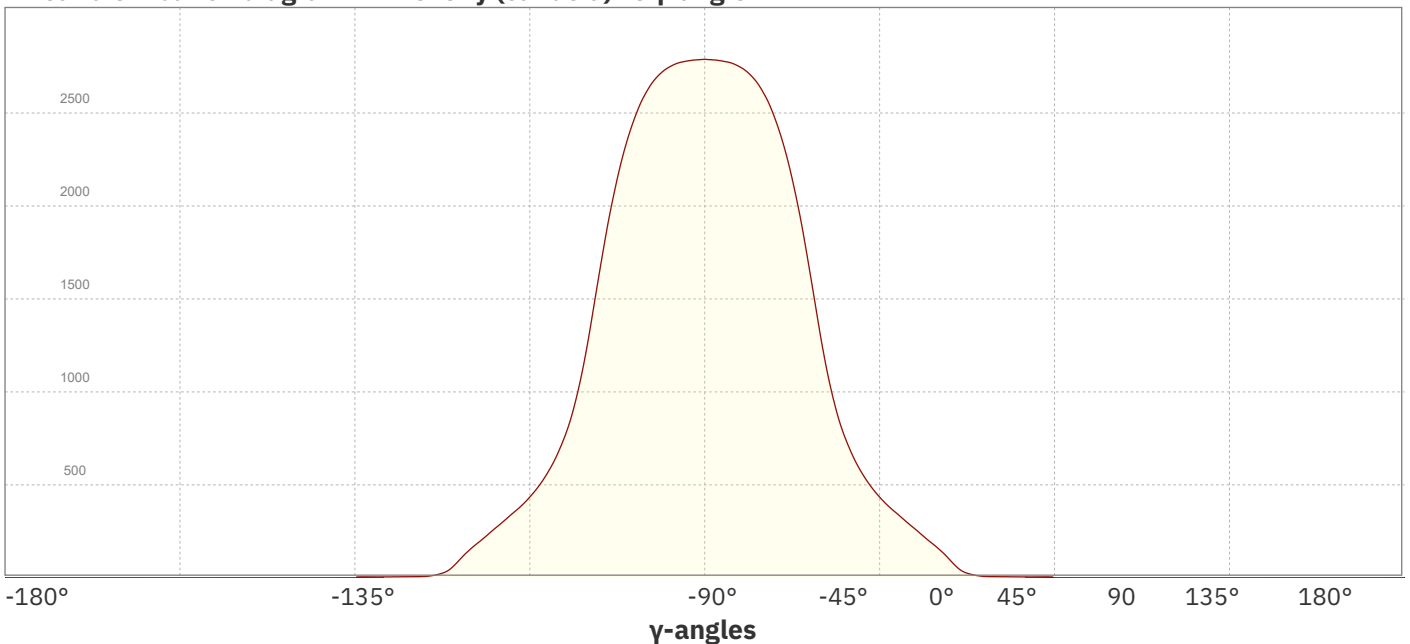
**Intensity Ratio**

In 120° cone	97.4%
In 90° cone	85.0%

**C planes**

- C000-C180
- C090-C270

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

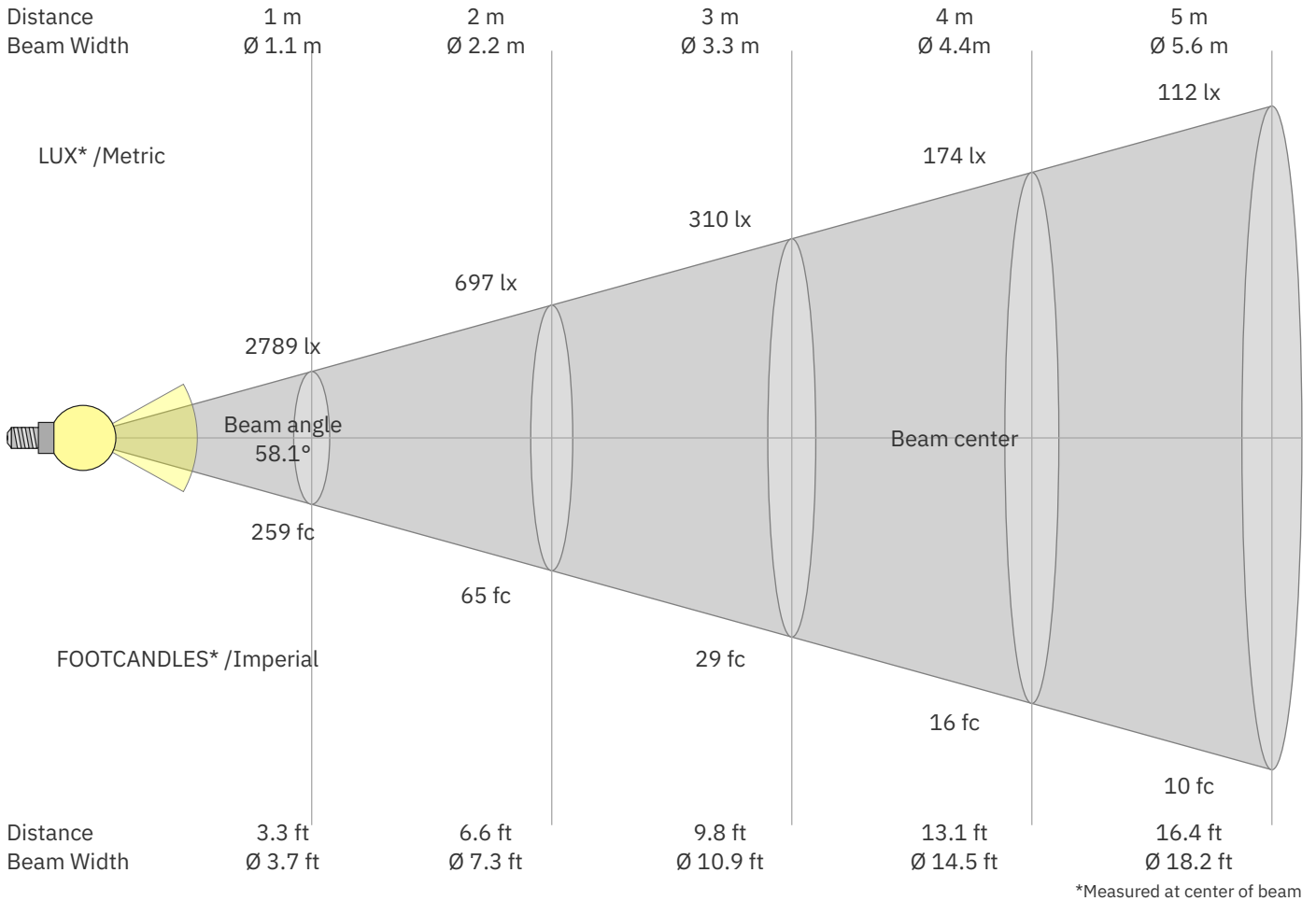


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Beam Details



\*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
2789	697	310	174	112	77	57	44	34	28	23	19	17	14	12	11	10	9	8	7	lux
259.1	64.8	28.8	16.2	10.4	7.2	5.3	4	3.2	2.6	2.1	1.8	1.5	1.3	1.2	1	0.9	0.8	0.7	0.6	fc

Intensities in 0° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
2789	2778	2735	2612	2348	1892	1276	820	579	434	336	247	159	56	12	6	5	5	1	0	cd
100%	100%	98%	94%	84%	68%	46%	29%	21%	16%	12%	9%	6%	2%	0%	0%	0%	0%	0%	0%	of 0°val

Intensities in 90° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
2789	2778	2735	2612	2348	1892	1276	820	579	434	336	247	159	56	12	6	5	5	1	0	cd
100%	100%	98%	94%	84%	68%	46%	29%	21%	16%	12%	9%	6%	2%	0%	0%	0%	0%	0%	0%	of 0°val

Intensities in 180° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
2789	2778	2735	2612	2348	1892	1276	820	579	434	336	247	159	56	12	6	5	5	1	0	cd
100%	100%	98%	94%	84%	68%	46%	29%	21%	16%	12%	9%	6%	2%	0%	0%	0%	0%	0%	0%	of 0°val

Intensities in 270° c-plane

0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	γ
2789	2778	2735	2612	2348	1892	1276	820	579	434	336	247	159	56	12	6	5	5	1	0	cd
100%	100%	98%	94%	84%	68%	46%	29%	21%	16%	12%	9%	6%	2%	0%	0%	0%	0%	0%	0%	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	20.3	21.1	20.4	21.3	21.5	20.3	21.1	20.4	21.3	21.5
	3H	20.1	21.0	20.5	21.2	21.4	20.1	21.0	20.5	21.2	21.4
	4H	20.0	20.8	20.4	21.1	21.3	20.0	20.8	20.4	21.1	21.3
	6H	20.0	20.7	20.3	21.0	21.4	20.0	20.7	20.3	21.0	21.4
	8H	20.0	20.6	20.3	21.0	21.4	20.0	20.6	20.3	21.0	21.4
	12H	19.9	20.6	20.3	20.9	21.4	19.9	20.6	20.3	20.9	21.4
4H	2H	20.2	21.1	20.6	21.3	21.5	20.2	21.1	20.6	21.3	21.5
	3H	20.2	20.8	20.5	21.2	21.6	20.2	20.8	20.5	21.2	21.6
	4H	20.1	20.7	20.5	21.1	21.6	20.1	20.7	20.5	21.1	21.6
	6H	20.0	20.6	20.5	20.9	21.3	20.0	20.6	20.5	20.9	21.3
	8H	19.9	20.5	20.5	20.9	21.2	19.9	20.5	20.5	20.9	21.2
	12H	19.9	20.3	20.4	20.8	21.2	19.9	20.3	20.4	20.8	21.2
8H	4H	19.9	20.5	20.4	20.8	21.2	19.9	20.5	20.4	20.8	21.2
	6H	19.9	20.3	20.4	20.7	21.3	19.9	20.3	20.4	20.7	21.3
	8H	19.9	20.2	20.4	20.7	21.4	19.9	20.2	20.4	20.7	21.4
	12H	19.9	20.1	20.4	20.6	21.2	19.9	20.1	20.4	20.6	21.2
12H	4H	19.9	20.3	20.4	20.7	21.2	19.9	20.3	20.4	20.7	21.2
	6H	19.9	20.2	20.4	20.7	21.3	19.9	20.2	20.4	20.7	21.3
	8H	19.8	20.1	20.4	20.6	21.2	19.8	20.1	20.4	20.6	21.2

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

S = 1.0H	1.4 / -1.2	1.4 / -1.2
S = 1.5H	2.7 / -4.4	2.7 / -4.4
S = 2.0H	4.2 / -10.5	4.2 / -10.5

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	102	100	
1	113	110	107	104	110	107	105	103	103	101	100	100	98	97	96	95	94	92
2	106	101	96	92	104	99	95	91	96	92	89	93	90	87	90	88	86	84
3	100	93	87	83	98	91	86	82	89	84	81	86	82	79	84	81	78	76
4	94	86	79	75	92	84	79	74	82	77	73	80	76	72	78	75	72	70
5	89	79	73	68	87	78	72	68	76	71	67	75	70	66	73	69	66	64
6	84	74	67	62	82	73	67	62	71	66	62	70	65	61	69	64	61	59
7	79	69	62	58	78	68	62	57	67	61	57	66	60	57	64	60	56	55
8	75	64	58	53	74	64	58	53	63	57	53	62	56	53	61	56	52	51
9	71	60	54	50	70	60	54	50	59	53	49	58	53	49	57	52	49	48
10	67	57	51	46	66	57	50	46	56	50	46	55	50	46	54	49	46	45