



PHOTOMETRIC LIGHT REPORT

**Ground spot | 230V |
170mm | 28 watt | 2700K |
adj. | dim**

Article number: 140-094



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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 140-094. 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 140-094 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 140-094 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
Gonio spectrometer system and type
Spectrometer manufacturer and model

Flicker meter manufacturer and model
Oscilloscope manufacturer and model
Power meter manufacturer and model

Power source manufacturer and model

Datalogger Manufacturer and Model

Tronix Lighting BV. Uden. The Netherlands
Viso Systems Type C. horizontal
(Gonio) Ocean Optics STS VIS
(Sphere) Admesy HERA VIS 380–780nm
Viso Systems LabFlicker
Tektronix MDO3024 oscilloscope (4 Channels. 200 MHz)
Vitretek PA900 Precision Multi-Channel Harmonic Power Analyzer
(DC) Keithley Source Measure Unit SMU-2420 3A DC Source Meter
(AC) Chroma 61601 AC Source
Omega 8-Channel Thermocouple Thermometer/Data Logger

Measurement conditions gonio spectrometer

Number of C-planes and Resolution
 γ (gamma)-Resolution
Test Distance
Room Temperature and Humidity
Input Power. Power and Displacement Factors
Frequency of Input Power
Warm-up Time and Variation

2 planes – 180°
1°
1.81 m
22°C +/- 10% – RH 50% +/- 20%
29.4 W – PF 0.97 – DPF 0.99
50 Hz
Lamp stabilized in 34 min 38 sec --10.2%

Tested light source

Manufacturer and Order Code
Product Description

Tronix Lighting – 140-094
Ground spot | 230V | 170mm | 28 watt | 2700K | adj. | dim

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)
Efficiency
Energy efficiency class
Peak Intensity and Beam Angle
Correlated Colour Temperature
Colour Shift. CIE duv
Colour Rendering Index
Colour Rendering TM30-18
Television Lighting Consistency Index
Flicker

2851 lm – 0% / 100%
97 lm/W
F
4351 cd – 42.3°
CCT = 2723 K
Duv -0.0019
CRI 84.2
 R_f 84.0 – R_g 99.9
TLCI = 64
SVM 0.02 – PstLM 0.22

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Electrical measurement details

Input Power

RMS Input voltage feed. V_{RMS}

233 V

RMS Input current feed. I_{RMS}

0.130 A

Total input power

29.4 W

Frequency of input power

50 Hz

Power factor

0.97

Displacement power factor

0.99

Total harmonic distortion of the current

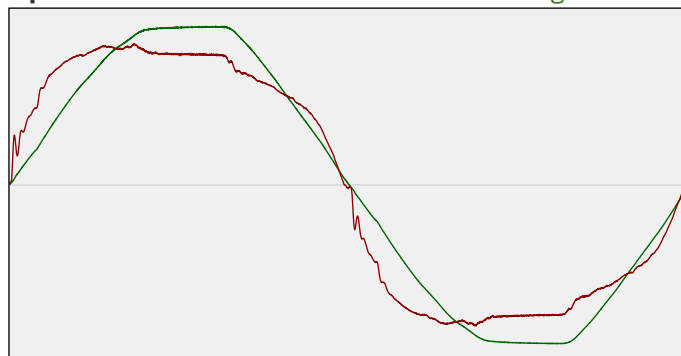
18.7%

Total harmonic distortion of the voltage

2.93%

Input Power Curve

Voltage - Current



Efficiency

Radiated power efficiency: 30.4%



Lumen efficiency: 97 lm/W



Harmonics

3rd Harmonic

17.33%

5th Harmonic

6.16%

7th Harmonic

2.96%

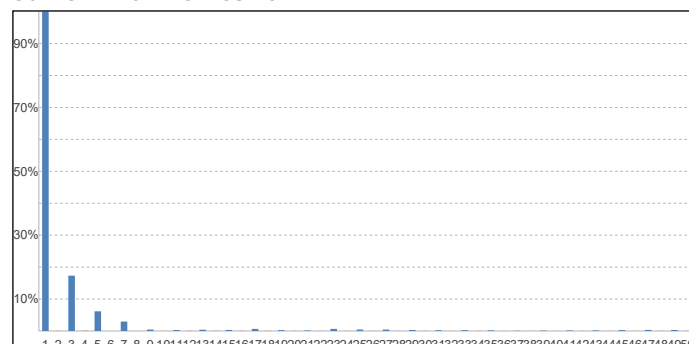
9th Harmonic

0.45%

11th Harmonic

0.31%

Current Harmonics %



Stabilization Details

Warm-up Conditions

Stable period

15 min CCT start

2696 K

Stable change max

2.0% CCT shift

+27 K

Minimum warm-up time

15 min CCT end

2723 K

Colour temperature change during warm-up

Warm-up Results

Total warmup time

Lamp stabilized in 34 min 38 sec

Output intensity change during warm-up

Output start

3164 lm

Warmup variation

-10.2% Output change

-312 lm

Output end

2851 lm

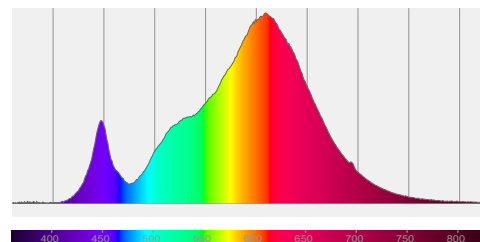
140-094 Ground spot | 230V | 170mm | 28 watt | 2700K | adj. | dim

Colour measurement details

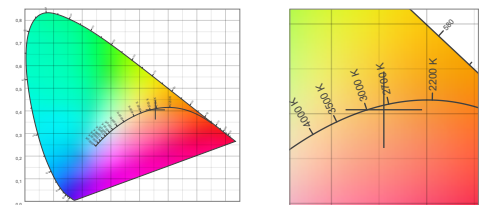
Total lumen output 2851 lm
 Correlated Colour Temperature 2723 K
 Colour coordinates CIE 1931 (x;y) = (0.455;0.404)
 Colour deviation from BBL Duv = -0.0019

TM30-18 Colour Fidelity Index R_f 84.0
 TM30-18 Colour Gamut Index R_g 99.9
 Colour Rendering Index (Ra) CRI 84.2
 Colour Rendering Index. (red component) $R_9 = 13.7$

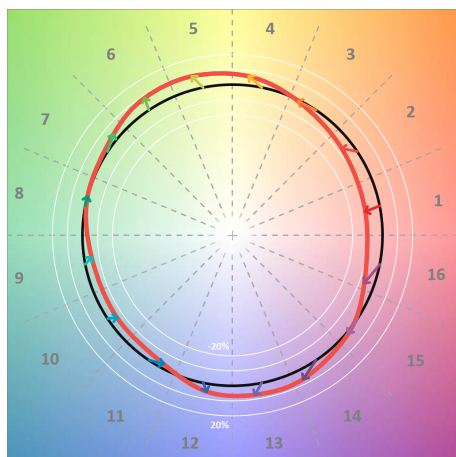
Colour Quality Scale CQS = 81.8
 Television Lighting Consistency Index TLCI = 64



Relative spectral power distribution



TM30 details

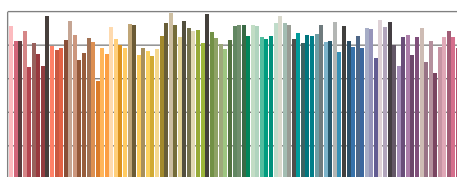


TM30 Colour vectors per hue bin

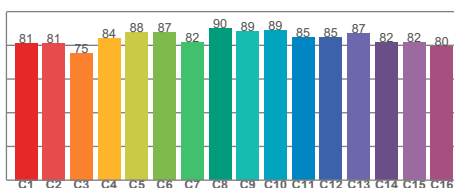


TM30 Colour distortion

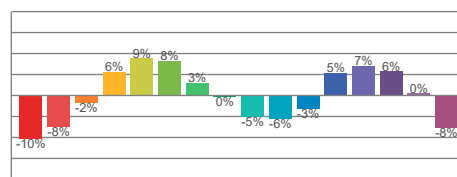
Hue Bin	R_f	Shifts (%)	
		Chroma	Hue
C1	81	-10%	-2%
C2	81	-8%	8%
C3	75	-2%	13%
C4	84	6%	10%
C5	88	9%	6%
C6	87	8%	-2%
C7	82	3%	-12%
C8	90	0%	-6%
C9	89	-5%	-4%
C10	89	-6%	3%
C11	85	-3%	9%
C12	85	5%	3%
C13	87	7%	-6%
C14	82	6%	-14%
C15	82	0%	-12%
C16	80	-8%	-14%



TM30-18 R_f -values per reference colour

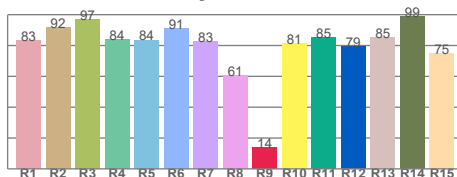


TM30-18 R_f -values per hue bin

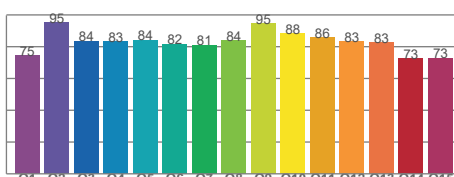


TM30 Chroma shift

Colour Quality details



Colour Rendering Index



Colour Quality Scale

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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)

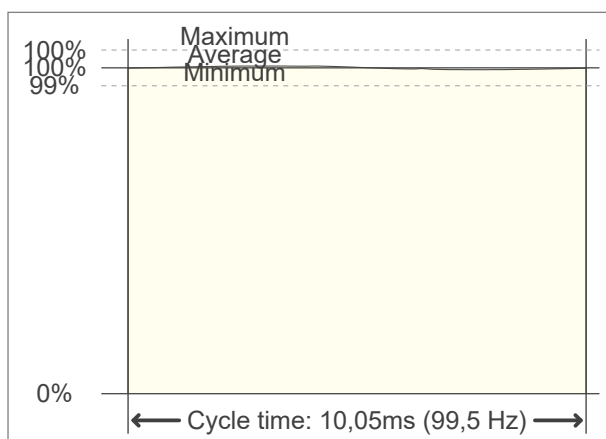
Flicker frequency	99.5 Hz
Percent flicker	0.78 %
Flicker index	0

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

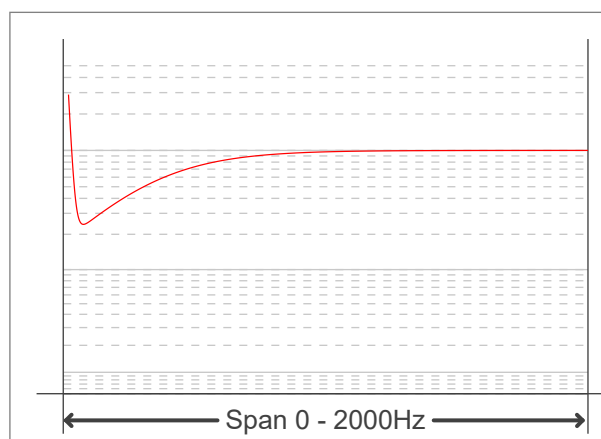
An LED luminaire is considered flicker-free if the SVM value is ≤ 0.4 and if the PstLM value is ≤ 1.0

PstLM value ($F < 80$ Hz)	0.22
SVM value ($80 < F < 2000$ Hz)	0.02

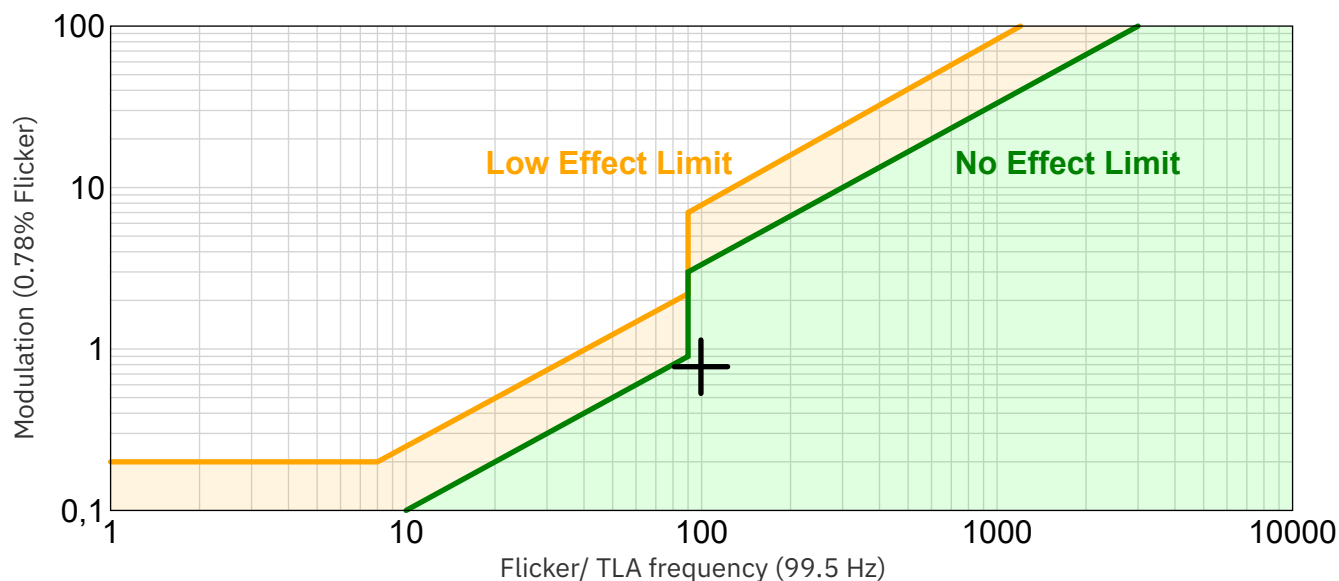
Flicker frame (one flicker period in time domain)



Flicker FFT (flicker curve in frequency domain)



IEEE 1789-2015 Lighting Flicker Risk Zones



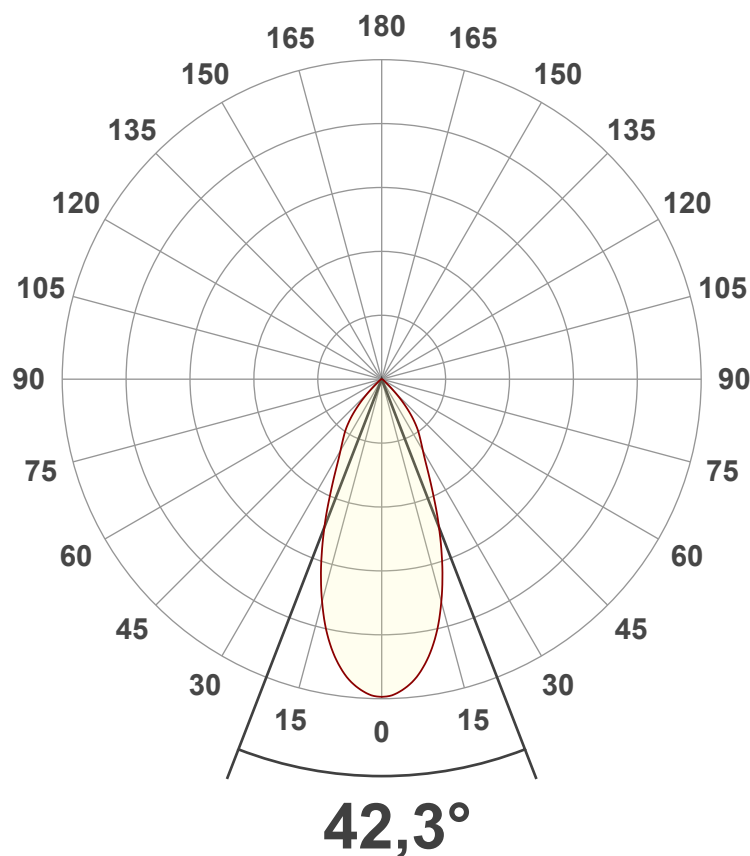
Document revision date: 1-7-2025 Measurement serial: VFR-250612-9639-SW

140-094 Ground spot | 230V | 170mm | 28 watt | 2700K | adj. | dim

Beam angle

Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	2851 lm
Lumen Up/Down	0% / 100%
Peak Intensity	4351 cd
Beam Angle (50%)	42.3°
Beam Angle (90%)	42.3°
Beam Angle (10%)	42.3°

Cut-off Angle

Average 2.5%	98.6°
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Field Angle

Average 10%	84.9°
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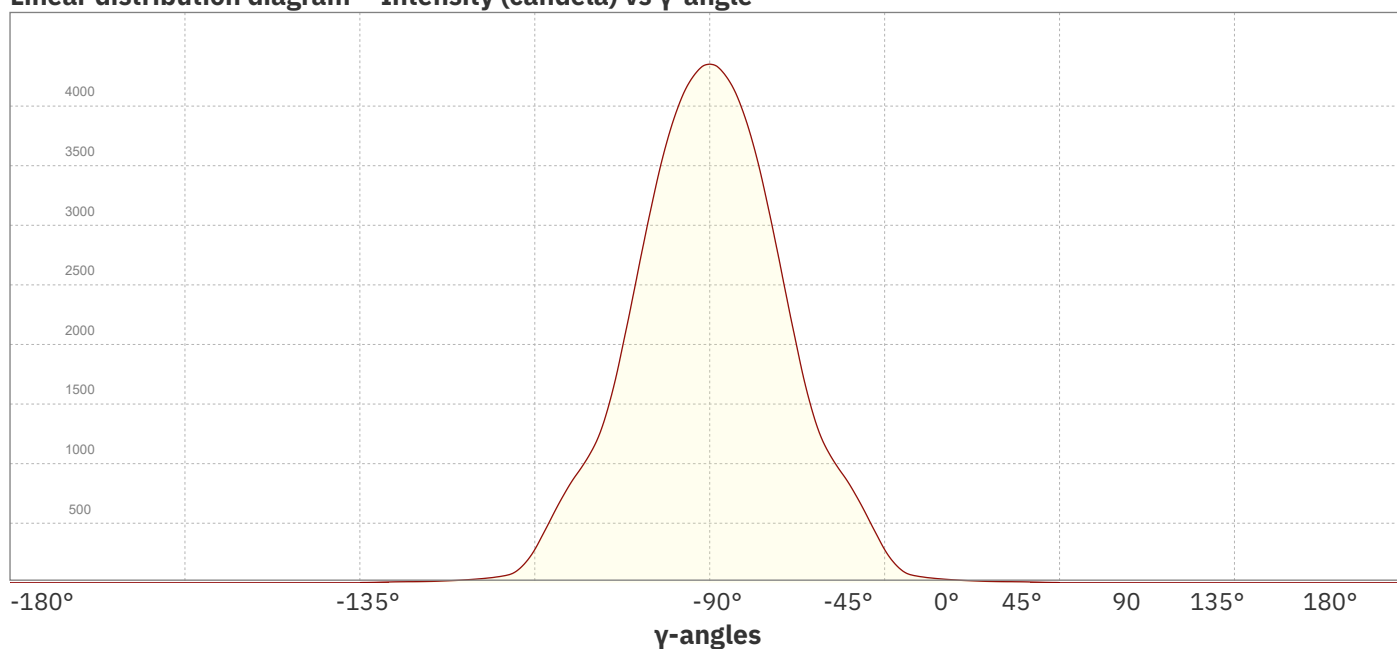
Intensity Ratio

In 120° cone	98.7%
In 90° cone	94.7%

C planes

C000-C180
C090-C270

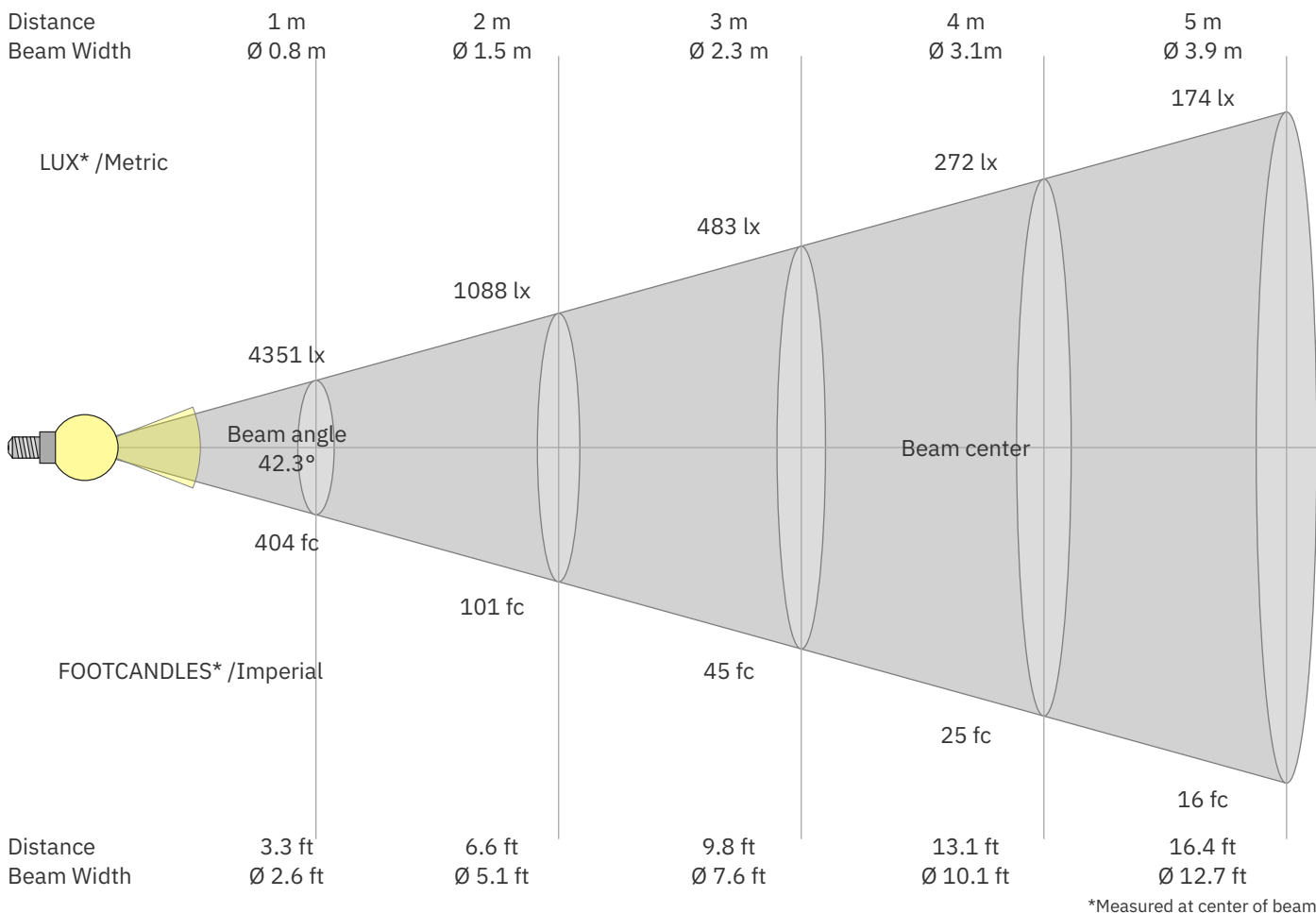
Linear distribution diagram - Intensity (candela) vs γ-angle



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Beam Details



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
4351	1088	483	272	174	121	89	68	54	44	36	30	26	22	19	17	15	13	12	11	lux
404.2	101	44.9	25.3	16.2	11.2	8.2	6.3	5	4	3.3	2.8	2.4	2.1	1.8	1.6	1.4	1.2	1.1	1	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
4351	4328	4258	4154	4003	3812	3580	3305	3005	2688	2361	2046	1742	1486	1279	1130	1017	920	823	711	cd
100%	99%	98%	95%	92%	88%	82%	76%	69%	62%	54%	47%	40%	34%	29%	26%	23%	21%	19%	16%	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
4351	4328	4258	4154	4003	3812	3580	3305	3005	2688	2361	2046	1742	1486	1279	1130	1017	920	823	711	cd
100%	99%	98%	95%	92%	88%	82%	76%	69%	62%	54%	47%	40%	34%	29%	26%	23%	21%	19%	16%	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
4351	4328	4258	4154	4003	3812	3580	3305	3005	2688	2361	2046	1742	1486	1279	1130	1017	920	823	711	cd
100%	99%	98%	95%	92%	88%	82%	76%	69%	62%	54%	47%	40%	34%	29%	26%	23%	21%	19%	16%	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
4351	4328	4258	4154	4003	3812	3580	3305	3005	2688	2361	2046	1742	1486	1279	1130	1017	920	823	711	cd
100%	99%	98%	95%	92%	88%	82%	76%	69%	62%	54%	47%	40%	34%	29%	26%	23%	21%	19%	16%	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	17.3	17.9	17.4	18.1	18.3	17.3	17.9	17.4	18.1	18.3
	3H	17.0	17.7	17.4	18.0	18.1	17.0	17.7	17.4	18.0	18.1
	4H	16.9	17.7	17.3	17.9	18.1	16.9	17.7	17.3	17.9	18.1
	6H	16.9	17.5	17.2	17.8	18.2	16.9	17.5	17.2	17.8	18.2
	8H	16.9	17.5	17.2	17.8	18.2	16.9	17.5	17.2	17.8	18.2
	12H	16.8	17.4	17.2	17.8	18.2	16.8	17.4	17.2	17.8	18.2
4H	2H	16.9	17.6	17.3	17.9	18.1	16.9	17.6	17.3	17.9	18.1
	3H	16.8	17.4	17.2	17.8	18.2	16.8	17.4	17.2	17.8	18.2
	4H	16.7	17.2	17.1	17.7	18.2	16.7	17.2	17.1	17.7	18.2
	6H	16.6	17.2	17.1	17.5	17.9	16.6	17.2	17.1	17.5	17.9
	8H	16.6	17.1	17.1	17.5	17.8	16.6	17.1	17.1	17.5	17.8
	12H	16.5	16.9	17.0	17.4	17.8	16.5	16.9	17.0	17.4	17.8
8H	4H	16.6	17.1	17.1	17.4	17.8	16.6	17.1	17.1	17.4	17.8
	6H	16.5	16.9	17.0	17.3	17.9	16.5	16.9	17.0	17.3	17.9
	8H	16.6	16.8	17.1	17.3	18.0	16.6	16.8	17.1	17.3	18.0
	12H	16.5	16.7	17.1	17.2	17.8	16.5	16.7	17.1	17.2	17.8
12H	4H	16.5	16.9	17.0	17.3	17.8	16.5	16.9	17.0	17.3	17.8
	6H	16.5	16.8	17.1	17.3	18.0	16.5	16.8	17.1	17.3	18.0
	8H	16.5	16.7	17.1	17.2	17.8	16.5	16.7	17.1	17.2	17.8
Variations with the observer position for the luminaire spacings. S:											
S = 1.0H		3.7 / -8.5					3.7 / -8.5				
S = 1.5H		6.2 / -10.0					6.2 / -10.0				
S = 2.0H		8.1 / -11.0					8.1 / -11.0				

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	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	111	106	106	106	102	102	102	100
1	113	111	108	106	111	108	106	104	104	103	101	101	99	98	97	96	95	93
2	108	103	99	96	106	101	98	94	98	95	92	95	93	90	92	90	89	87
3	102	96	91	87	100	95	90	86	92	88	85	90	86	84	87	85	82	81
4	97	90	84	80	96	89	84	80	87	82	79	85	81	78	83	80	77	75
5	93	84	79	74	91	83	78	74	82	77	73	80	76	73	78	75	72	71
6	88	79	73	69	87	79	73	69	77	72	68	76	71	68	74	71	68	66
7	84	75	69	65	83	74	69	65	73	68	64	72	67	64	71	67	64	62
8	80	71	65	61	79	70	65	61	69	64	60	68	63	60	67	63	60	59
9	76	67	61	57	75	66	61	57	66	61	57	65	60	57	64	60	57	55
10	73	64	58	54	72	63	58	54	62	57	54	62	57	54	61	57	54	52