



PHOTOMETRIC LIGHT REPORT

**Ground spot | 230V |
106mm | 9 watt | 2700K |
adj. | dim**

Article number: 140-082



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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 140-082. 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 140-082 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 140-082 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	8.8 W – PF 0.97 – DPF 0.99
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Lamp stabilized in 18 min 6 sec --3.7%

Tested light source

Manufacturer and Order Code	Tronix Lighting – 140-082
Product Description	Ground spot 230V 106mm 9 watt 2700K adj. dim

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	582 lm – 0% / 100%
Efficiency	66 lm/W
Energy efficiency class	G
Peak Intensity and Beam Angle	1284 cd – 36.5°
Correlated Colour Temperature	CCT = 2805 K
Colour Shift. CIE duv	Duv -0.0004
Colour Rendering Index	CRI 83.7
Colour Rendering TM30-18	R _f 84.3 – R _g 99.0
Television Lighting Consistency Index	TLCI = 65
Flicker	SVM 0.02 – PstLM 0.15

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Electrical measurement details

Input Power

RMS Input voltage feed. V_{RMS}

232 V

RMS Input current feed. I_{RMS}

0.039 A

Total input power

8.8 W

Frequency of input power

50 Hz

Power factor

0.97

Displacement power factor

0.99

Total harmonic distortion of the current

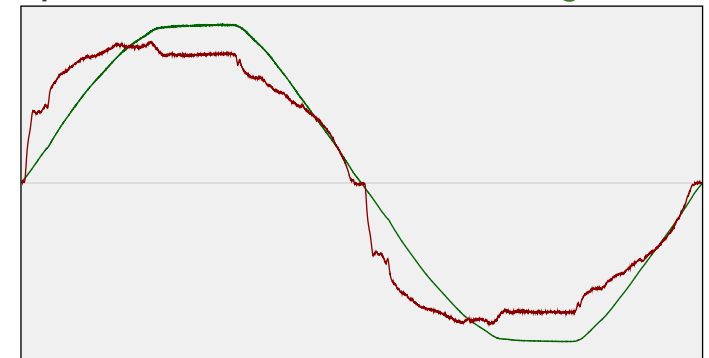
17.28%

Total harmonic distortion of the voltage

2.7%

Input Power Curve

Voltage - Current



Efficiency

Radiated power efficiency: 20.5%



Lumen efficiency: 66 lm/W



Harmonics

3rd Harmonic

15.28%

5th Harmonic

5.95%

7th Harmonic

3.53%

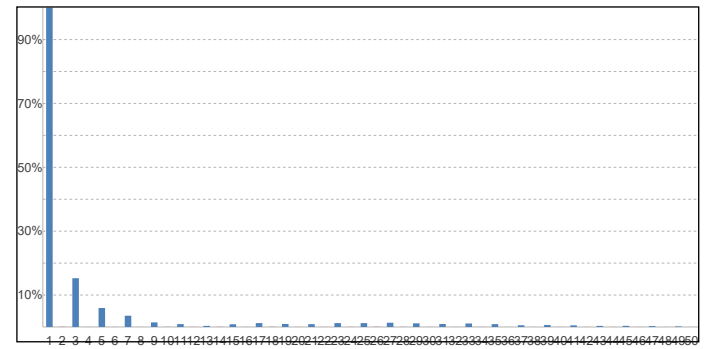
9th Harmonic

1.44%

11th Harmonic

0.91%

Current Harmonics %



Stabilization Details

Warm-up Conditions

Stable period

15 min CCT start

2796 K

Stable change max

2.0% CCT shift

+9 K

Minimum warm-up time

15 min CCT end

2805 K

Colour temperature change during warm-up

Warm-up Results

Total warmup time

Lamp stabilized in 18 min 6 sec

Output start

603 lm

Warmup variation

-3.7%

Output change

-21 lm

Output end

582 lm

Output intensity change during warm-up

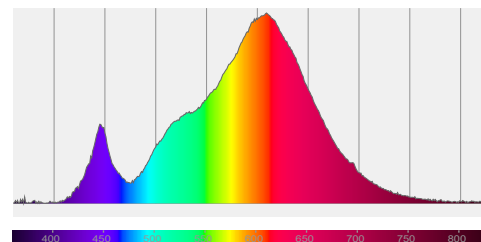
140-082 Ground spot | 230V | 106mm | 9 watt | 2700K | adj. | dim

Colour measurement details

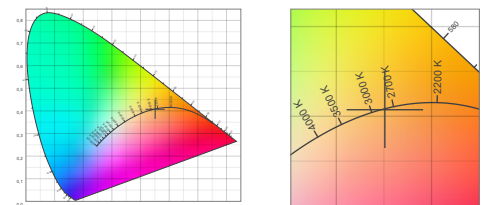
Total lumen output 582 lm
 Correlated Colour Temperature 2805 K
 Colour coordinates CIE 1931 (x;y) = (0.451;0.407)
 Colour deviation from BBL Duv = -0.0004

TM30-18 Colour Fidelity Index R_f 84.3
 TM30-18 Colour Gamut Index R_g 99.0
 Colour Rendering Index (Ra) CRI 83.7
 Colour Rendering Index. (red component) $R_9 = 10.6$

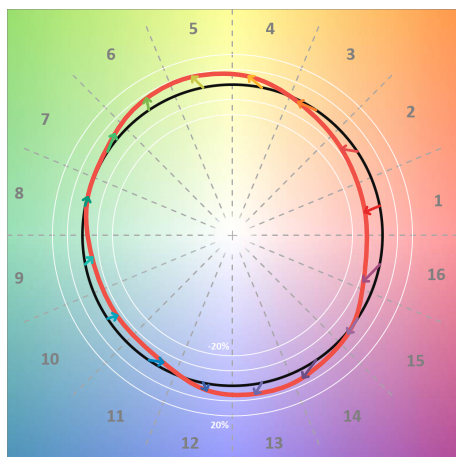
Colour Quality Scale CQS = 82.2
 Television Lighting Consistency Index TLCI = 65



Relative spectral power distribution



TM30 details

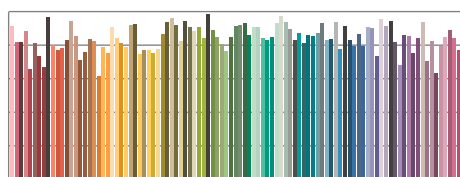


TM30 Colour vectors per hue bin

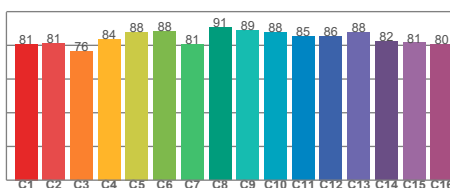


TM30 Colour distortion

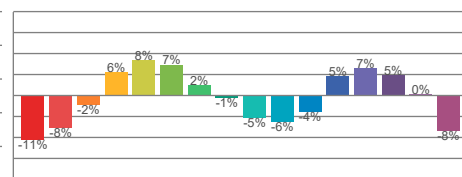
Hue Bin	R_f	Shifts (%)	
		Chroma	Hue
C1	81	-11%	-2%
C2	81	-8%	7%
C3	76	-2%	13%
C4	84	6%	10%
C5	88	8%	6%
C6	88	7%	-3%
C7	81	2%	-12%
C8	91	-1%	-6%
C9	89	-5%	-4%
C10	88	-6%	2%
C11	85	-4%	9%
C12	86	5%	3%
C13	88	7%	-6%
C14	82	5%	-14%
C15	81	0%	-12%
C16	80	-8%	-13%



TM30-18 R_f -values per reference colour

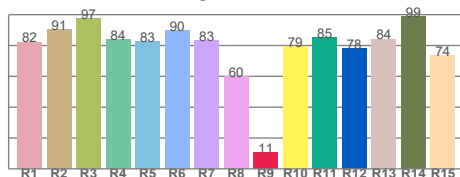


TM30-18 R_f -values per hue bin

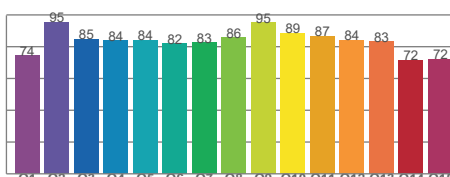


TM30 Chroma shift

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)

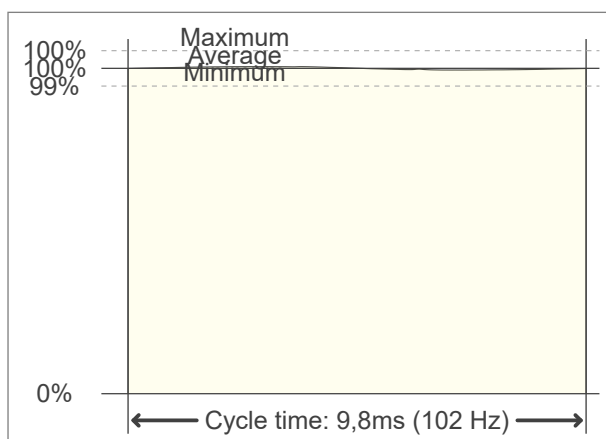
Flicker frequency	102.04 Hz
Percent flicker	0.78 %
Flicker index	0

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

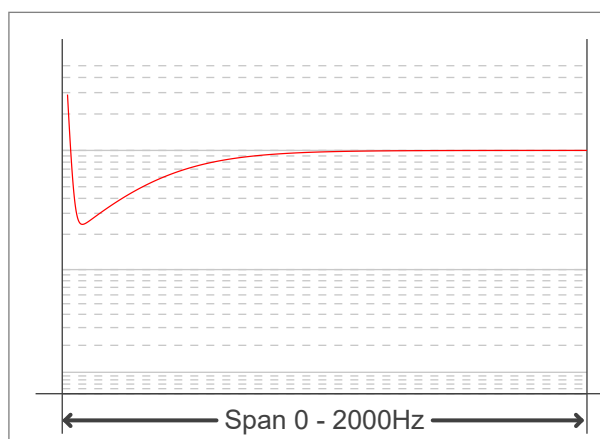
An LED luminaire is considered flicker-free if the SVM value is ≤ 0.4 and if the PstLM value is ≤ 1.0

PstLM value ($F < 80$ Hz)	0.15
SVM value ($80 < F < 2000$ Hz)	0.02

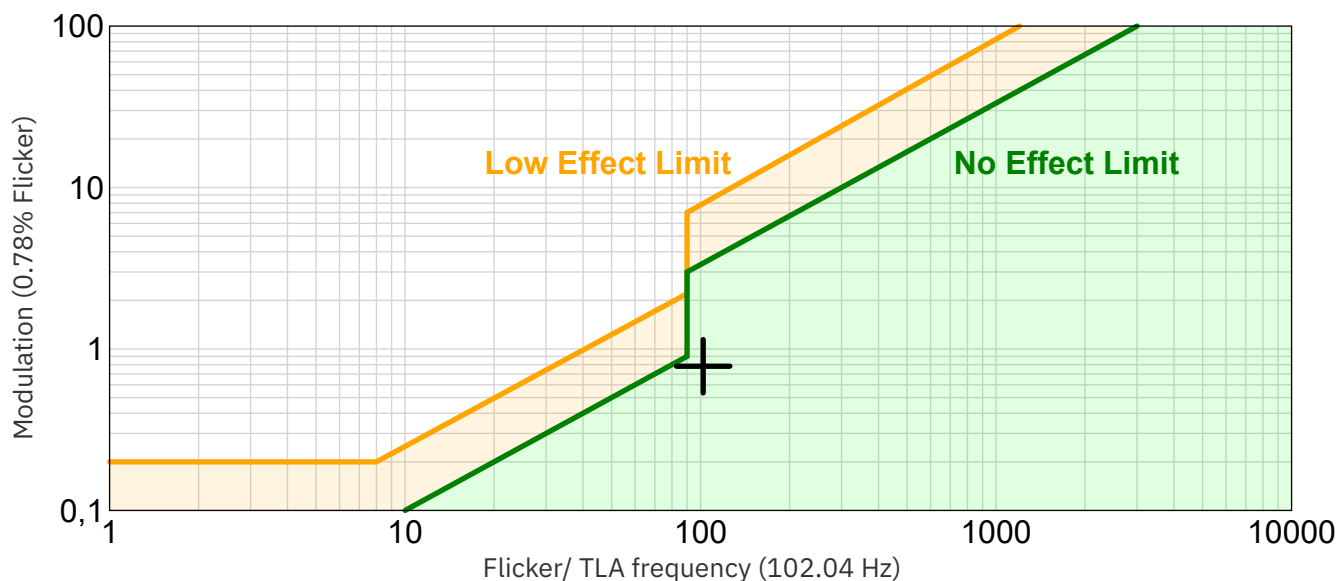
Flicker frame (one flicker period in time domain)



Flicker FFT (flicker curve in frequency domain)



IEEE 1789-2015 Lighting Flicker Risk Zones



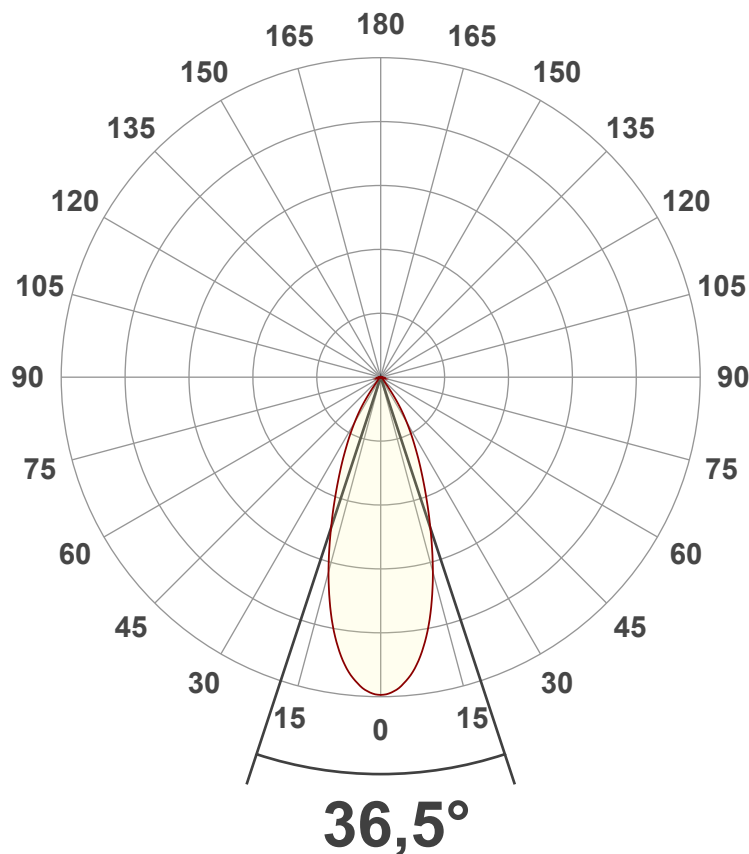
Document revision date: 1-7-2025 Measurement serial: VFR-250610-9602-SW

140-082 Ground spot | 230V | 106mm | 9 watt | 2700K | adj. | dim

Beam angle

Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	582 lm
Lumen Up/Down	0% / 100%
Peak Intensity	1284 cd
Beam Angle (50%)	36.5°
Beam Angle (90%)	36.5°
Beam Angle (10%)	36.5°

Cut-off Angle

Average 2.5%	77.4°
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Field Angle

Average 10%	66.6°
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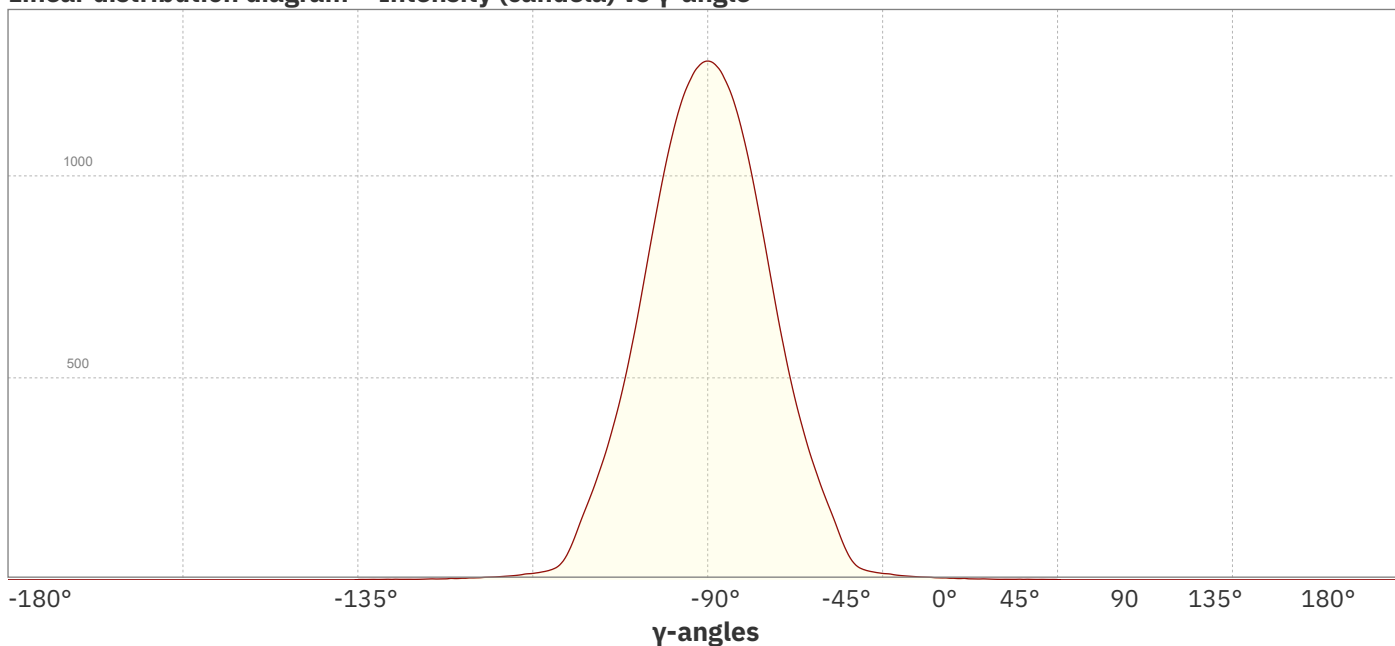
Intensity Ratio

In 120° cone	99.0%
In 90° cone	97.0%

C planes

C000-C180
C090-C270

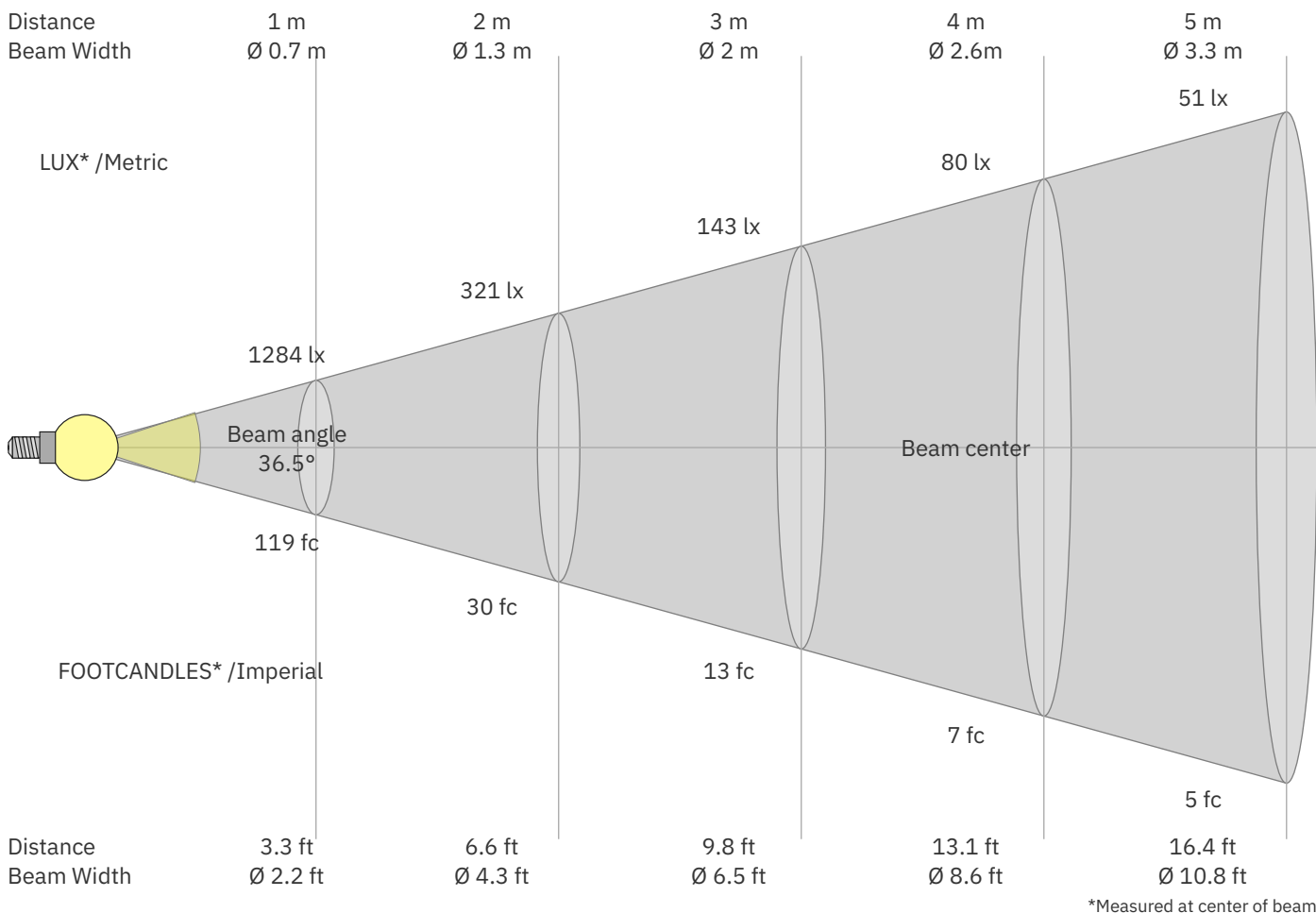
Linear distribution diagram - Intensity (candela) vs γ-angle



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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
1284	321	143	80	51	36	26	20	16	13	11	9	8	7	6	5	4	4	4	3	lux
119.2	29.8	13.2	7.5	4.8	3.3	2.4	1.9	1.5	1.2	1	0.8	0.7	0.6	0.5	0.5	0.4	0.4	0.3	0.3	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
1284	1274	1247	1203	1142	1063	971	868	761	654	556	467	391	323	264	210	162	111	66	38	cd
100%	99%	97%	94%	89%	83%	76%	68%	59%	51%	43%	36%	30%	25%	21%	16%	13%	9%	5%	3%	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
1284	1274	1247	1203	1142	1063	971	868	761	654	556	467	391	323	264	210	162	111	66	38	cd
100%	99%	97%	94%	89%	83%	76%	68%	59%	51%	43%	36%	30%	25%	21%	16%	13%	9%	5%	3%	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
1284	1274	1247	1203	1142	1063	971	868	761	654	556	467	391	323	264	210	162	111	66	38	cd
100%	99%	97%	94%	89%	83%	76%	68%	59%	51%	43%	36%	30%	25%	21%	16%	13%	9%	5%	3%	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
1284	1274	1247	1203	1142	1063	971	868	761	654	556	467	391	323	264	210	162	111	66	38	cd
100%	99%	97%	94%	89%	83%	76%	68%	59%	51%	43%	36%	30%	25%	21%	16%	13%	9%	5%	3%	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	10.5	11.0	10.6	11.2	11.4	10.5	11.0	10.6	11.2	11.4
	3H	10.2	10.9	10.6	11.1	11.3	10.2	10.9	10.6	11.1	11.3
	4H	10.2	10.8	10.6	11.1	11.3	10.2	10.8	10.6	11.1	11.3
	6H	10.2	10.7	10.5	11.0	11.4	10.2	10.7	10.5	11.0	11.4
	8H	10.2	10.7	10.5	11.0	11.4	10.2	10.7	10.5	11.0	11.4
	12H	10.1	10.6	10.5	11.0	11.4	10.1	10.6	10.5	11.0	11.4
4H	2H	10.2	10.8	10.6	11.1	11.3	10.2	10.8	10.6	11.1	11.3
	3H	10.1	10.6	10.5	11.0	11.4	10.1	10.6	10.5	11.0	11.4
	4H	10.0	10.5	10.4	10.9	11.4	10.0	10.5	10.4	10.9	11.4
	6H	10.0	10.5	10.5	10.8	11.2	10.0	10.5	10.5	10.8	11.2
	8H	9.9	10.4	10.4	10.7	11.1	9.9	10.4	10.4	10.7	11.1
	12H	9.9	10.2	10.4	10.7	11.1	9.9	10.2	10.4	10.7	11.1
8H	4H	9.9	10.4	10.4	10.7	11.1	9.9	10.4	10.4	10.7	11.1
	6H	9.9	10.2	10.4	10.6	11.2	9.9	10.2	10.4	10.6	11.2
	8H	9.9	10.1	10.4	10.7	11.3	9.9	10.1	10.4	10.7	11.3
	12H	9.9	10.1	10.5	10.6	11.2	9.9	10.1	10.5	10.6	11.2
12H	4H	9.8	10.2	10.3	10.6	11.1	9.8	10.2	10.3	10.6	11.1
	6H	9.9	10.1	10.4	10.6	11.3	9.9	10.1	10.4	10.6	11.3
	8H	9.8	10.1	10.4	10.6	11.2	9.8	10.1	10.4	10.6	11.2
Variations with the observer position for the luminaire spacings. S:											
S = 1.0H		5.9 / -6.5					5.9 / -6.5				
S = 1.5H		8.6 / -7.6					8.6 / -7.6				
S = 2.0H		10.5 / -8.7					10.5 / -8.7				

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	114	112	109	107	112	109	107	106	105	104	102	102	100	99	98	97	96	95
2	109	105	101	98	107	103	100	97	100	97	95	97	95	93	94	93	91	90
3	105	99	95	91	103	98	94	90	95	92	89	93	90	88	91	88	86	85
4	100	94	89	85	99	93	88	85	91	87	84	89	85	83	87	84	82	81
5	96	89	84	80	95	88	83	80	86	82	79	85	81	79	83	80	78	77
6	92	85	80	76	91	84	79	76	83	78	75	81	78	75	80	77	74	73
7	89	81	76	72	88	80	75	72	79	75	71	78	74	71	77	73	71	70
8	85	77	72	69	84	77	72	68	76	71	68	75	71	68	74	70	68	66
9	82	74	69	65	81	74	69	65	73	68	65	72	68	65	71	67	65	64
10	79	71	66	63	78	71	66	63	70	65	62	69	65	62	68	65	62	61