



PHOTOMETRIC LIGHT REPORT

Track spot | 3-phase | white | 20W | 930-935-940 | 45° | dim

Article number: 169-293



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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 169-293. 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 169-293 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 169-293 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%
19.1 W – PF 0.98 – DPF 0.99
50 Hz
n/a – n/a%

Tested light source

Manufacturer and Order Code
Product Description

Tronix Lighting – 169-293
Track spot | 3-phase | white | 20W | 930-935-940 | 45° | 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

1743 lm – 0.01% / 99.99%
91 lm/W
F
2584 cd – 46.5°
CCT = 3403 K
 Duv -0.0023
CRI 93.4
 R_f 90.0 – R_g 99.8
TLCI = 86
SVM 0 – PstLM 0.31

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Electrical measurement details

Input Power

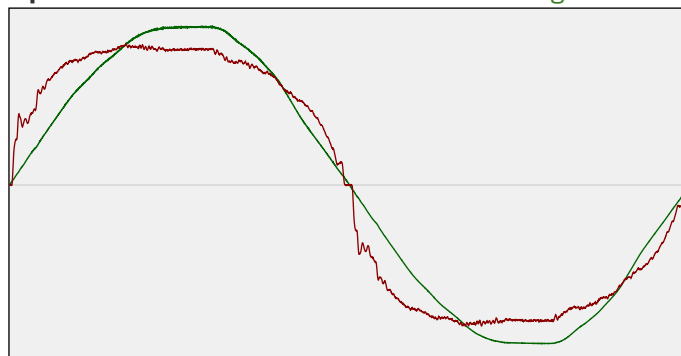
RMS Input voltage feed. V_{RMS} 232 V
 RMS Input current feed. I_{RMS} 0.084 A
 Total input power 19.1 W

Frequency of input power 50 Hz
 Power factor 0.98
 Displacement power factor 0.99

Total harmonic distortion of the current 18.63%
 Total harmonic distortion of the voltage 2.53%

Input Power Curve

Voltage - Current



Efficiency

Radiated power efficiency: 27.4%



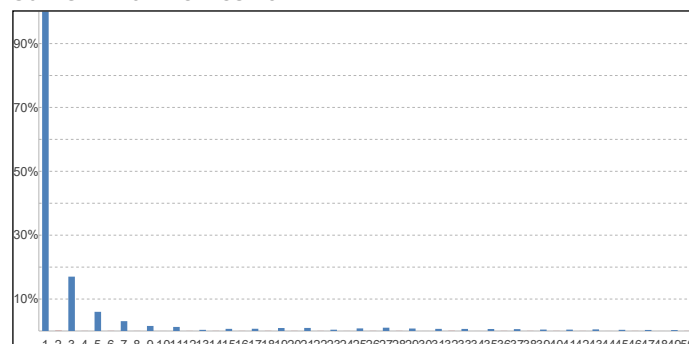
Lumen efficiency: 91 lm/W



Harmonics

3rd Harmonic 17.02%
 5th Harmonic 6%
 7th Harmonic 3.07%
 9th Harmonic 1.58%
 11th Harmonic 1.27%

Current Harmonics %



Stabilization Details

Warm-up Conditions

Stable period
 Stable change max
 Minimum warm-up time

Colour temperature change during warm-up

n/a CCT start n/a K
 n/a% CCT shift n/a K
 n/a CCT end 3403 K

Warm-up Results

Total warmup time
 Warmup variation

Output intensity change during warm-up

n/a Output start n/a lm
 n/a% Output change n/a lm
 Output end 1743 lm

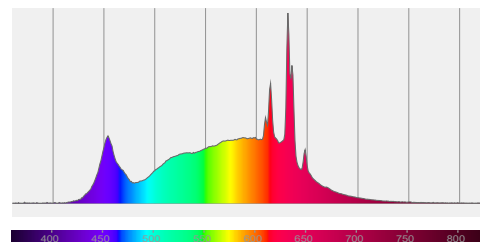
169-293 Track spot | 3-phase | white | 20W | 930-935-940 | 45° | dim

Colour measurement details

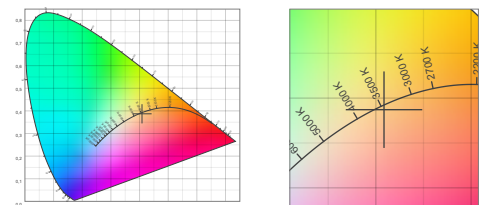
Total lumen output 1743 lm
 Correlated Colour Temperature 3403 K
 Colour coordinates CIE 1931 (x;y) = (0.409;0.387)
 Colour deviation from BBL Duv = -0.0023

TM30-18 Colour Fidelity Index R_f 90.0
 TM30-18 Colour Gamut Index R_g 99.8
 Colour Rendering Index (Ra) CRI 93.4
 Colour Rendering Index. (red component) $R_9 = 62.3$

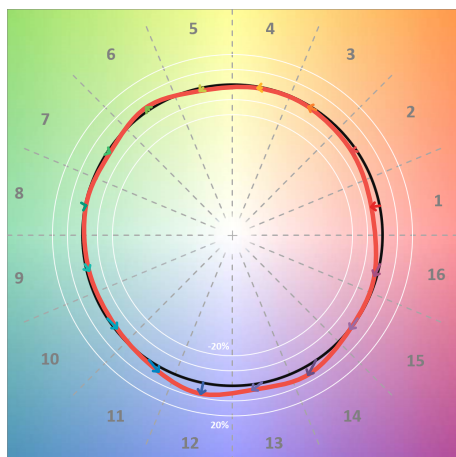
Colour Quality Scale CQS = 90.7
 Television Lighting Consistency Index TLCI = 86



Relative spectral power distribution



TM30 details

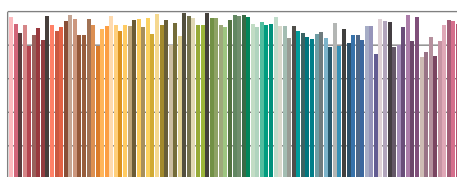


TM30 Colour vectors per hue bin

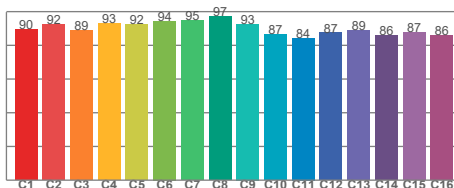


TM30 Colour distortion

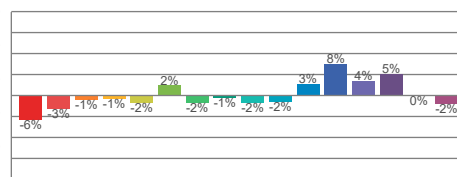
Hue Bin	R_f	Shifts (%)	
		Chroma	Hue
C1	90	-6%	0%
C2	92	-3%	3%
C3	89	-1%	5%
C4	93	-1%	3%
C5	92	-2%	3%
C6	94	2%	1%
C7	95	-2%	0%
C8	97	-1%	0%
C9	93	-2%	4%
C10	87	-2%	9%
C11	84	3%	9%
C12	87	8%	0%
C13	89	4%	-7%
C14	86	5%	-10%
C15	87	0%	-8%
C16	86	-2%	-8%



TM30-18 R_f -values per reference colour

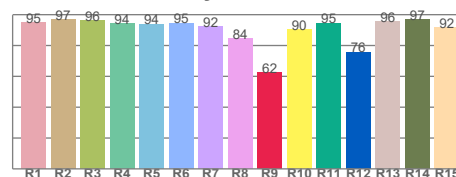


TM30-18 R_f -values per hue bin

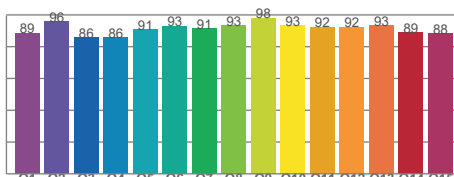


TM30 Chroma shift

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	100 Hz
Percent flicker	0.43 %
Flicker index	0

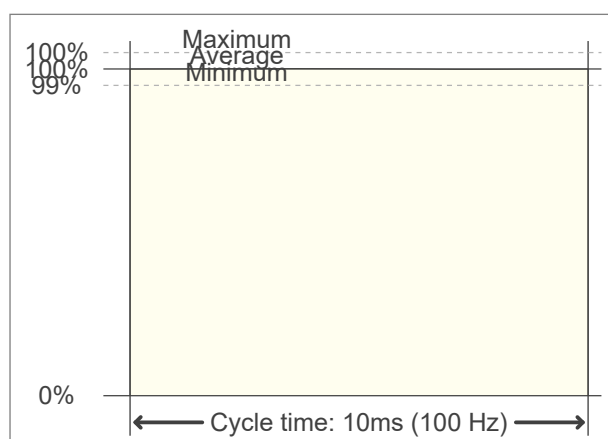
TLA indices (according IEC TR 61547-1, EN 61000-3-3 and EN 61000-4-15)

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

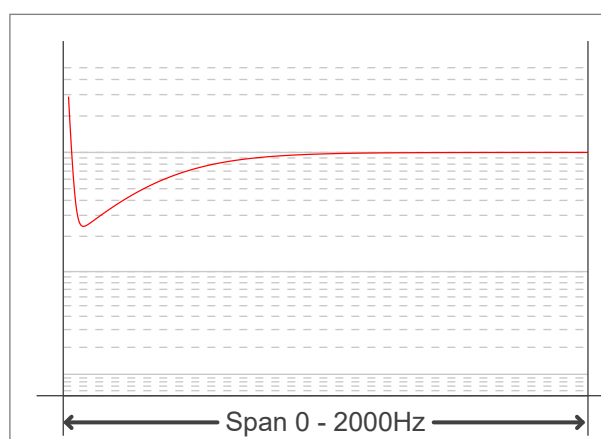
PstLM value ($F < 80$ Hz) 0.31

SVM value ($80 < F < 2000$ Hz) 0

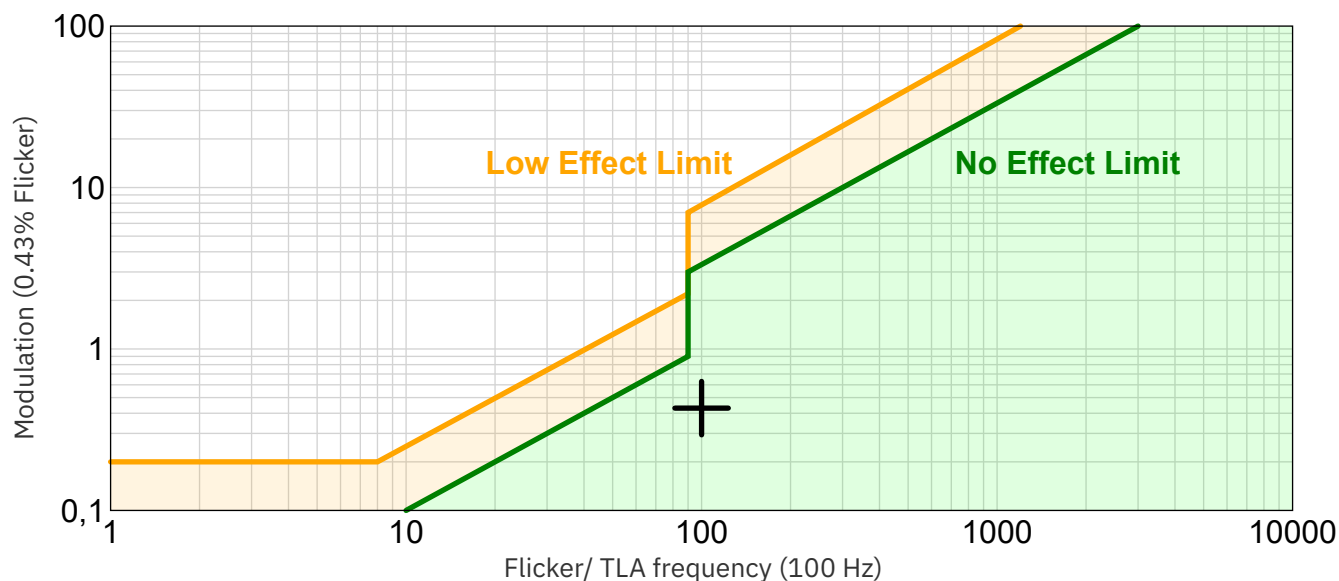
Flicker frame (one flicker period in time domain)



Flicker FFT (flicker curve in frequency domain)



IEEE 1789-2015 Lighting Flicker Risk Zones



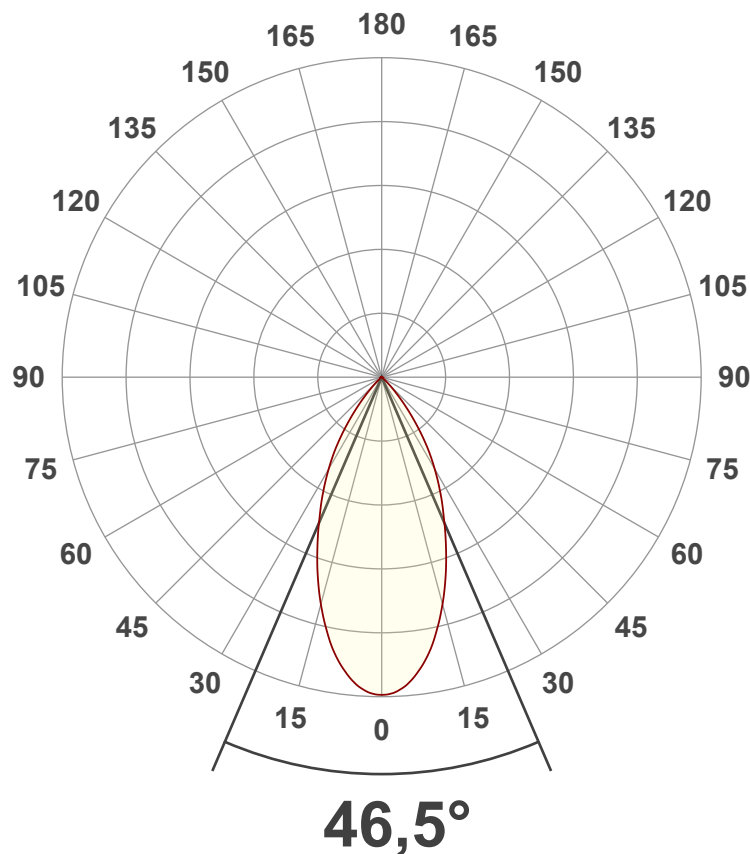
Document revision date: 1-7-2025 Measurement serial: VFR-250117-0106-MS

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Beam angle

Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1743 lm
Lumen Up/Down	0.01% / 99.99%
Peak Intensity	2584 cd
Beam Angle (50%)	46.5°
Beam Angle (90%)	46.5°
Beam Angle (10%)	46.5°

Cut-off Angle

Average 2.5%	92.6°
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Field Angle

Average 10%	80.8°
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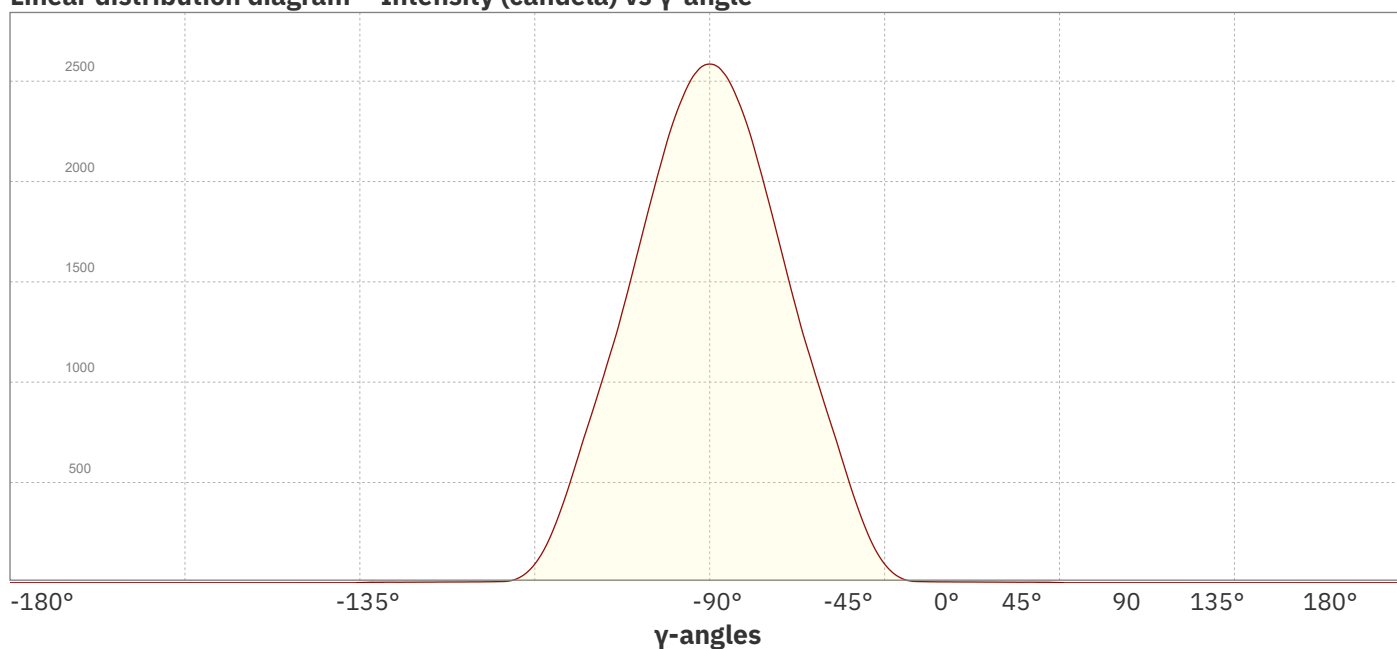
Intensity Ratio

In 120° cone	99.4%
In 90° cone	98.0%

C planes

C000-C180
C090-C270

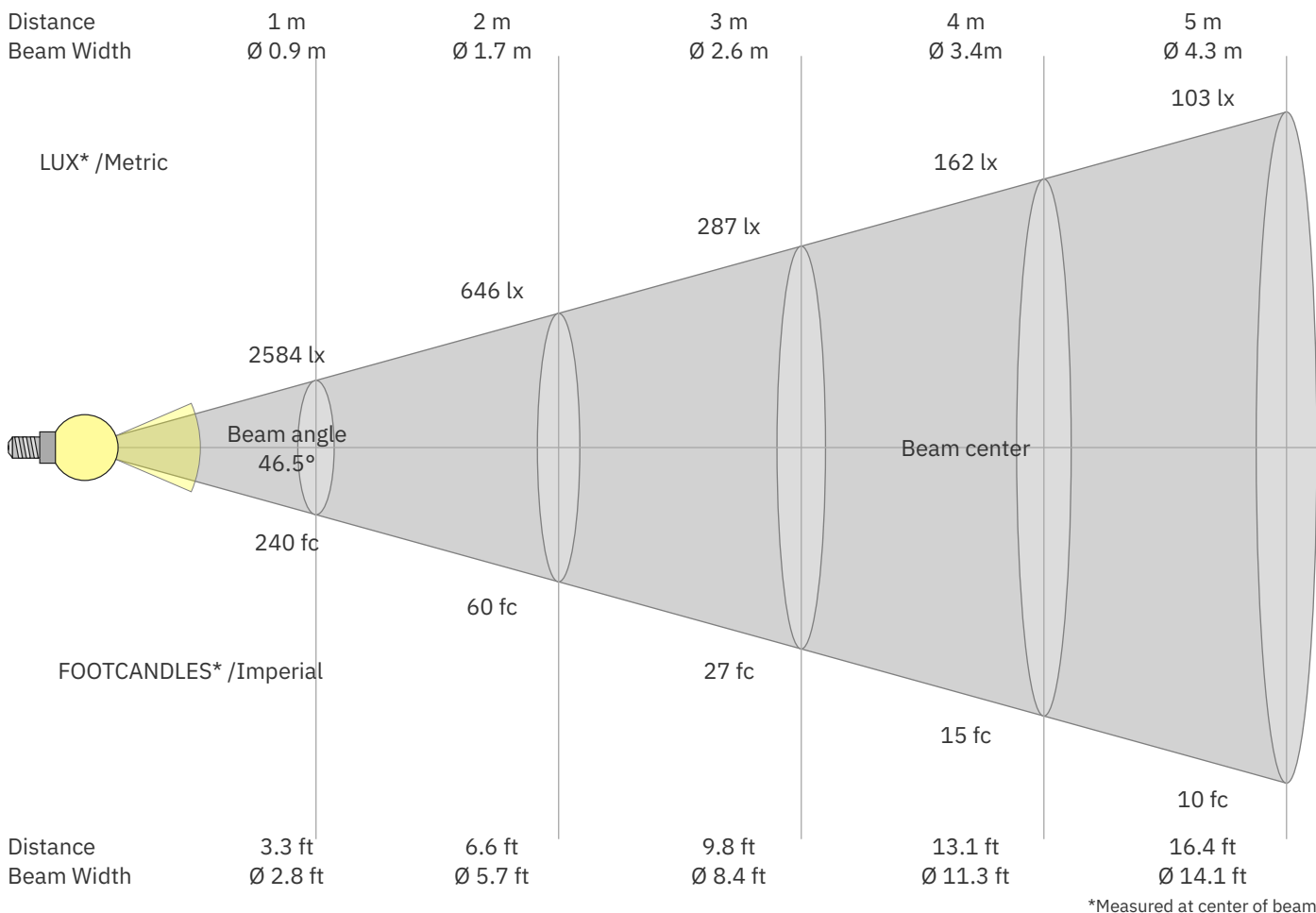
Linear distribution diagram - Intensity (candela) vs γ-angle



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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
2584	646	287	162	103	72	53	40	32	26	21	18	15	13	11	10	9	8	7	6	lux
240.1	60	26.7	15	9.6	6.7	4.9	3.8	3	2.4	2	1.7	1.4	1.2	1.1	0.9	0.8	0.7	0.7	0.6	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
2584	2572	2530	2461	2370	2259	2127	1985	1838	1686	1534	1385	1242	1114	987	863	743	619	495	380	cd
100%	100%	98%	95%	92%	87%	82%	77%	71%	65%	59%	54%	48%	43%	38%	33%	29%	24%	19%	15%	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
2584	2572	2530	2461	2370	2259	2127	1985	1838	1686	1534	1385	1242	1114	987	863	743	619	495	380	cd
100%	100%	98%	95%	92%	87%	82%	77%	71%	65%	59%	54%	48%	43%	38%	33%	29%	24%	19%	15%	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
2584	2572	2530	2461	2370	2259	2127	1985	1838	1686	1534	1385	1242	1114	987	863	743	619	495	380	cd
100%	100%	98%	95%	92%	87%	82%	77%	71%	65%	59%	54%	48%	43%	38%	33%	29%	24%	19%	15%	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
2584	2572	2530	2461	2370	2259	2127	1985	1838	1686	1534	1385	1242	1114	987	863	743	619	495	380	cd
100%	100%	98%	95%	92%	87%	82%	77%	71%	65%	59%	54%	48%	43%	38%	33%	29%	24%	19%	15%	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	22.0	22.6	22.1	22.8	23.0	22.0	22.6	22.1	22.8	23.0
	3H	21.7	22.4	22.1	22.6	22.8	21.7	22.4	22.1	22.6	22.8
	4H	21.6	22.3	22.0	22.6	22.8	21.6	22.3	22.0	22.6	22.8
	6H	21.6	22.2	21.9	22.5	22.9	21.6	22.2	21.9	22.5	22.9
	8H	21.6	22.2	21.9	22.5	22.9	21.6	22.2	21.9	22.5	22.9
	12H	21.6	22.1	21.9	22.5	22.9	21.6	22.1	21.9	22.5	22.9
4H	2H	21.6	22.3	22.0	22.6	22.8	21.6	22.3	22.0	22.6	22.8
	3H	21.5	22.1	21.9	22.4	22.8	21.5	22.1	21.9	22.4	22.8
	4H	21.4	21.9	21.8	22.3	22.8	21.4	21.9	21.8	22.3	22.8
	6H	21.3	21.9	21.8	22.2	22.6	21.3	21.9	21.8	22.2	22.6
	8H	21.3	21.8	21.8	22.2	22.5	21.3	21.8	21.8	22.2	22.5
	12H	21.3	21.7	21.8	22.1	22.6	21.3	21.7	21.8	22.1	22.6
8H	4H	21.3	21.8	21.8	22.1	22.5	21.3	21.8	21.8	22.1	22.5
	6H	21.3	21.6	21.8	22.0	22.6	21.3	21.6	21.8	22.0	22.6
	8H	21.3	21.6	21.8	22.1	22.7	21.3	21.6	21.8	22.1	22.7
	12H	21.3	21.6	21.9	22.1	22.7	21.3	21.6	21.9	22.1	22.7
12H	4H	21.2	21.6	21.7	22.0	22.5	21.2	21.6	21.7	22.0	22.5
	6H	21.3	21.5	21.8	22.0	22.7	21.3	21.5	21.8	22.0	22.7
	8H	21.3	21.5	21.9	22.0	22.6	21.3	21.5	21.9	22.0	22.6
Variations with the observer position for the luminaire spacings. S:											
S = 1.0H		4.8 / -7.7					4.8 / -7.7				
S = 1.5H		7.4 / -8.0					7.4 / -8.0				
S = 2.0H		9.4 / -8.2					9.4 / -8.2				

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	111	109	106	111	109	107	105	105	103	101	101	100	98	98	97	96	94
2	108	104	100	96	106	102	98	95	99	96	93	96	93	91	93	91	89	88
3	103	97	92	88	101	96	91	88	93	89	86	91	88	85	88	86	84	82
4	98	91	86	82	96	90	85	81	88	84	80	86	82	79	84	81	78	77
5	94	86	80	76	92	85	79	76	83	78	75	81	77	74	80	76	74	72
6	89	81	75	71	88	80	74	71	78	74	70	77	73	70	76	72	69	68
7	85	76	70	66	84	75	70	66	74	69	66	73	69	65	72	68	65	64
8	81	72	66	62	80	71	66	62	70	66	62	69	65	62	68	64	61	60
9	78	68	63	59	76	68	62	59	67	62	59	66	62	58	65	61	58	57
10	74	65	59	56	73	64	59	56	64	59	55	63	58	55	62	58	55	54