



PHOTOMETRIC LIGHT REPORT

LED P45 | 1 watt | warm white | 3000K | white PC cap

Article number: 165-039



Go to the
webshop
of Tronix
Lighting



TRONIX

165-039 LED P45 | 1 watt | warm white | 3000K | white PC cap

Introduction

Purpose of this Document

This document provides accurate and objective photometric data for Tronix Lighting item 165-039. 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 165-039 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 165-039 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.

165-039 LED P45 | 1 watt | warm white | 3000K | white PC cap

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	5°
Test Distance	0.66 m
Room Temperature and Humidity	22°C +/- 10% – RH 50% +/- 20%
Input Power. Power and Displacement Factors	0.77 W – PF 0.15 – DPF 0.15
Frequency of Input Power	50 Hz
Warm-up Time and Variation	Not completed – +3.7%

Tested light source

Manufacturer and Order Code	Tronix Lighting – 165-039
Product Description	LED P45 1 watt warm white 3000K white PC cap

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	23.2 lm – 38.4% / 61.6%
Efficiency	30 lm/W
Energy efficiency class	G
Peak Intensity and Beam Angle	2.33 cd – 266.3°
Correlated Colour Temperature	CCT = 3007 K
Colour Shift. CIE duv	Duv 0.0080
Colour Rendering Index	CRI 65.7
Colour Rendering TM30-18	R _f 69.8 – R _g 92.6
Television Lighting Consistency Index	TLCI = 40
Flicker	SVM 2.98 – PstLM 0.38

165-039 LED P45 | 1 watt | warm white | 3000K | white PC cap

Electrical measurement details

Input Power

RMS Input voltage feed. V_{RMS}

RMS Input current feed. I_{RMS}

Total input power

Frequency of input power

Power factor

Displacement power factor

Total harmonic distortion of the current

Total harmonic distortion of the voltage

229 V

0.022 A

0.77 W

50 Hz

0.15

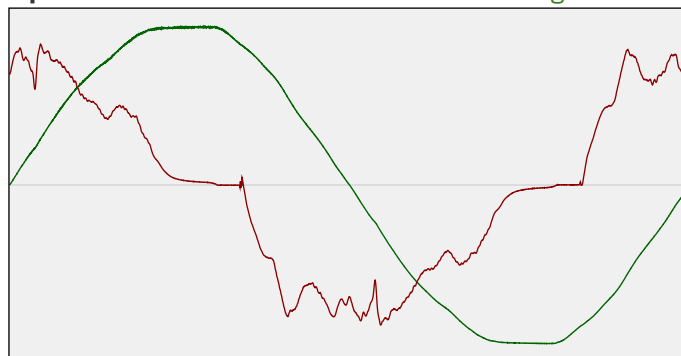
0.15

20.69%

2.32%

Input Power Curve

Voltage - Current



Efficiency

Radiated power efficiency: 8.5%



Lumen efficiency: 30 lm/W



Harmonics

3rd Harmonic

5th Harmonic

7th Harmonic

9th Harmonic

11th Harmonic

11.92%

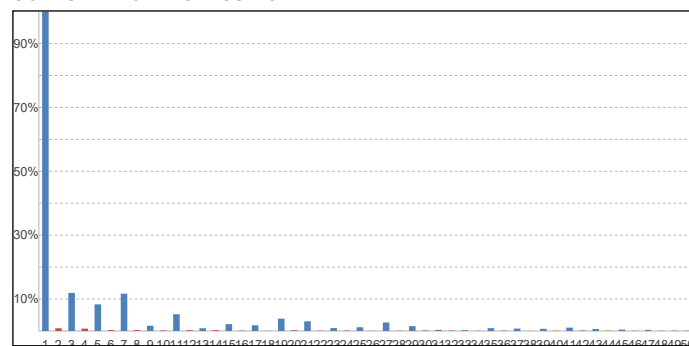
8.34%

11.68%

1.65%

5.25%

Current Harmonics %



Stabilization Details

Warm-up Conditions

Stable period

Stable change max

Minimum warm-up time

15 min CCT start

2.0% CCT shift

15 min CCT end

Colour temperature change during warm-up

2964 K

+43 K

3007 K

Warm-up Results

Total warmup time

Warmup variation

Not completed

+3.7%

Output intensity change during warm-up

Output start

Output change

Output end

22.6 lm

+0.6 lm

23.2 lm

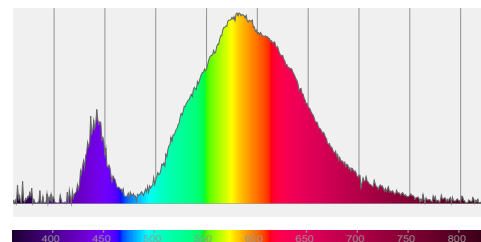
165-039 LED P45 | 1 watt | warm white | 3000K | white PC cap

Colour measurement details

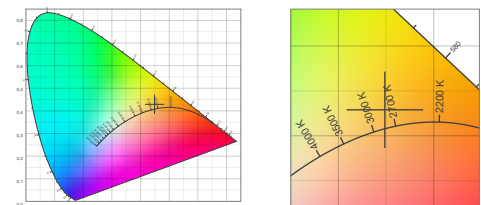
Total lumen output 23.2 lm
 Correlated Colour Temperature 3007 K
 Colour coordinates CIE 1931 (x;y) = (0.449;0.429)
 Colour deviation from BBL Duv = 0.0080

TM30-18 Colour Fidelity Index R_f 69.8
 TM30-18 Colour Gamut Index R_g 92.6
 Colour Rendering Index (Ra) CRI 65.7
 Colour Rendering Index. (red component) $R_9 = -36.8$

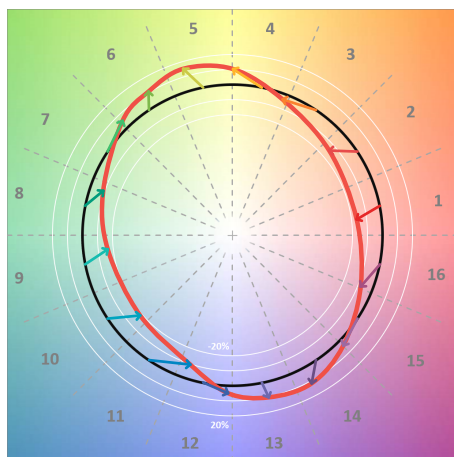
Colour Quality Scale CQS = 67.7
 Television Lighting Consistency Index TLCI = 40



Relative spectral power distribution



TM30 details

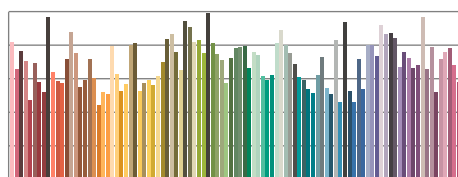


TM30 Colour vectors per hue bin

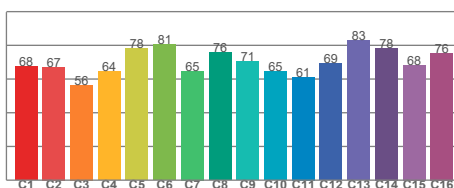


TM30 Colour distortion

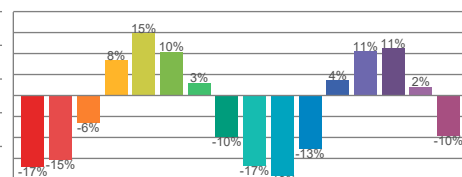
Hue Bin	R_f	Shifts (%)	
		Chroma	Hue
C1	68	-17%	-6%
C2	67	-15%	11%
C3	56	-6%	22%
C4	64	8%	21%
C5	78	15%	11%
C6	81	10%	-7%
C7	65	3%	-23%
C8	76	-10%	-12%
C9	71	-17%	-7%
C10	65	-19%	10%
C11	61	-13%	25%
C12	69	4%	18%
C13	83	11%	3%
C14	78	11%	-11%
C15	68	2%	-20%
C16	76	-10%	-17%



TM30-18 R_f -values per reference colour

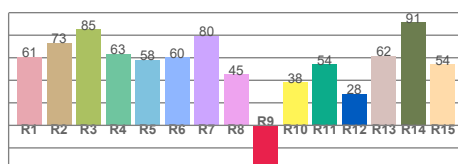


TM30-18 R_f -values per hue bin

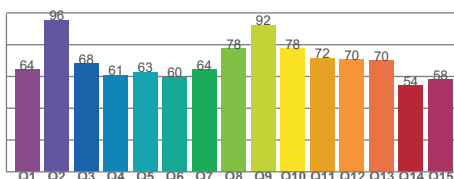


TM30 Chroma shift

Colour Quality details



Colour Rendering Index



Colour Quality Scale

165-039 LED P45 | 1 watt | warm white | 3000K | white PC cap

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)

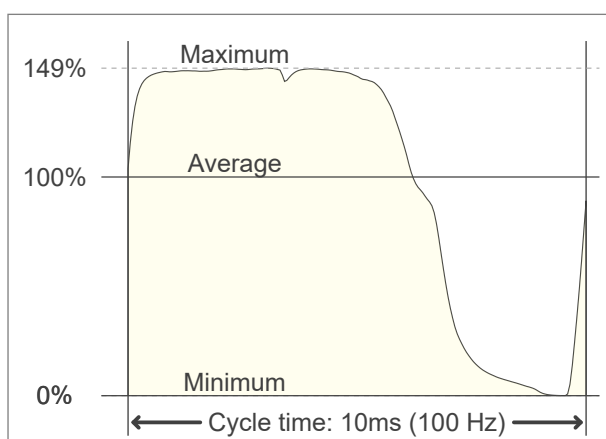
Flicker frequency	100 Hz
Percent flicker	99.97 %
Flicker index	0.27

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

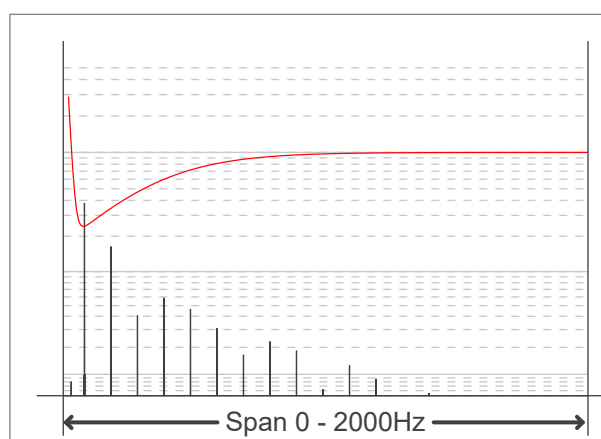
An LED luminaire is considered flicker-free if the SVM value is ≤ 0.4 and if the PstLM value is ≤ 1.0

PstLM value ($F < 80$ Hz)	0.38
SVM value ($80 < F < 2000$ Hz)	2.98

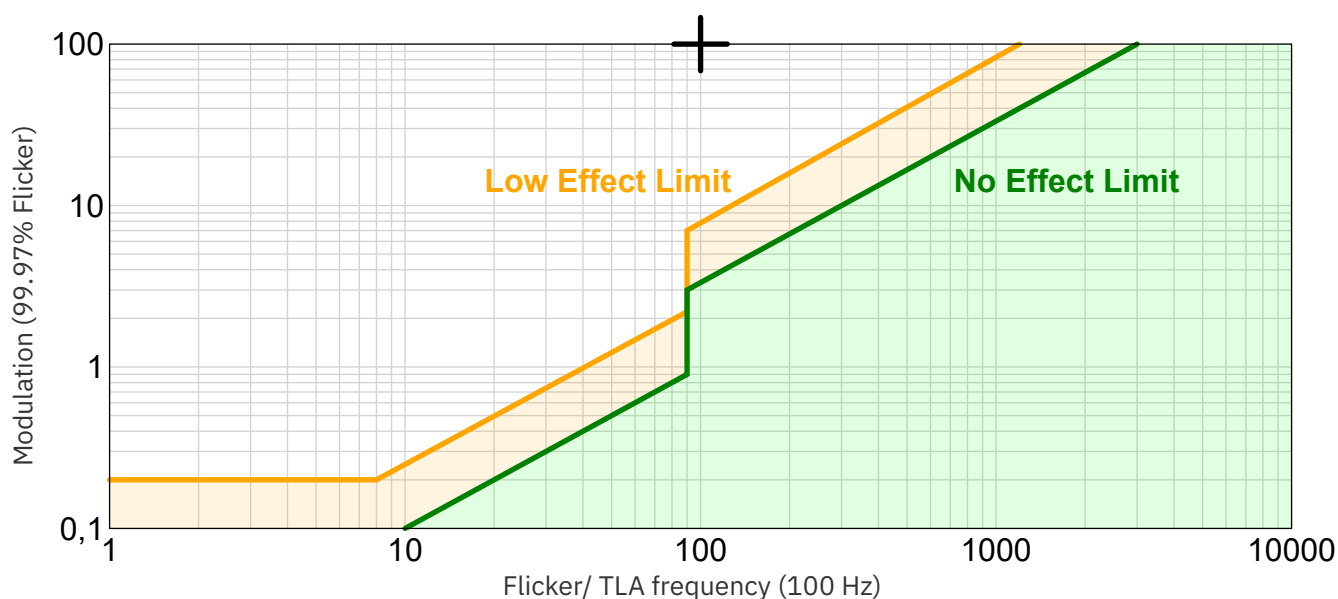
Flicker frame (one flicker period in time domain)



Flicker FFT (flicker curve in frequency domain)



IEEE 1789-2015 Lighting Flicker Risk Zones



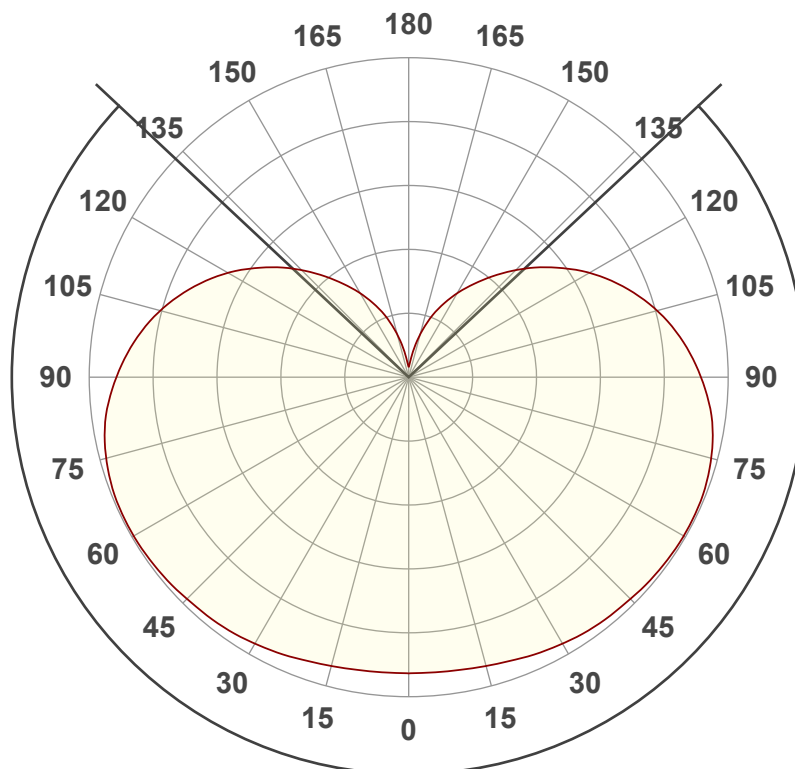
Document revision date: 3-7-2025 Measurement serial: VFR-250630-9923-SW

165-039 LED P45 | 1 watt | warm white | 3000K | white PC cap

Beam angle

Luminous Intensity diagram

Unit: 0-100% of peak intensity



266,3°

Main Values

Output (total Lumen)	23.2 lm
Lumen Up/Down	38.4% / 61.6%
Peak Intensity	2.33 cd
Beam Angle (50%)	266.3°
Beam Angle (90%)	266.3°
Beam Angle (10%)	266.3°

Cut-off Angle

Average 2.5%	360°
--------------	------

Field Angle

Average 10%	337.5°
-------------	--------

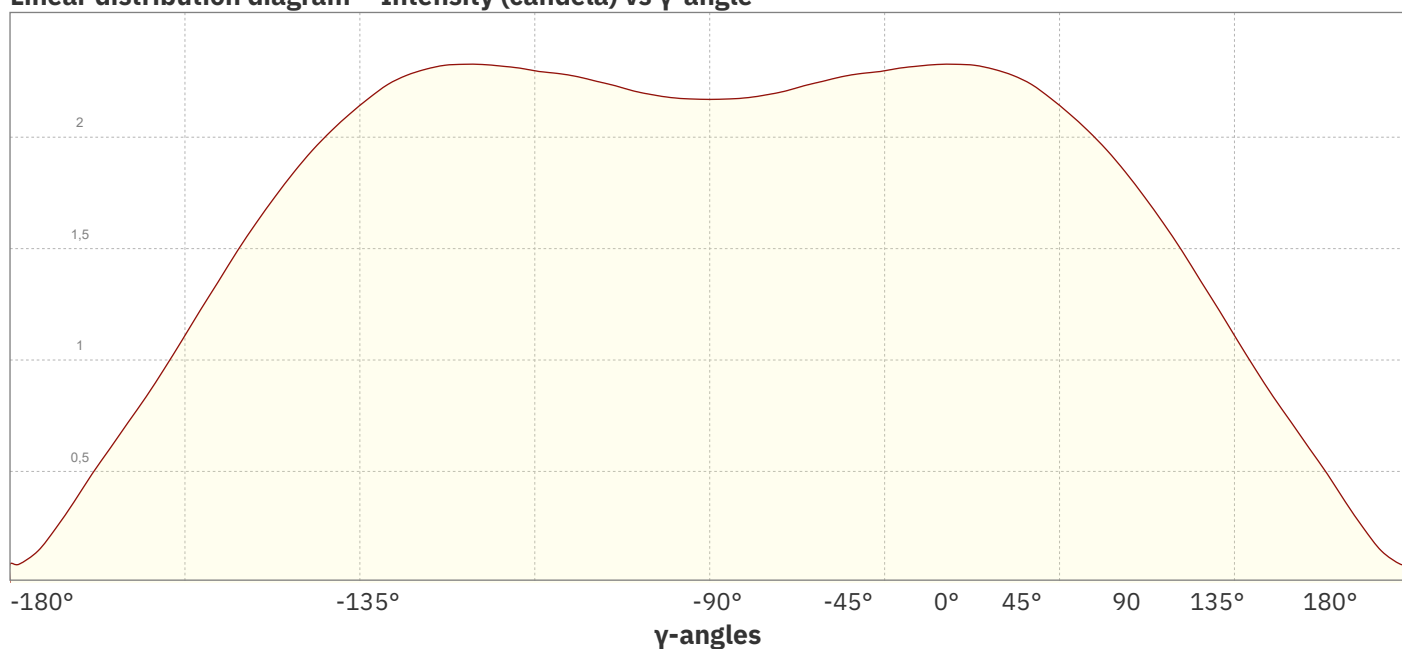
Intensity Ratio

In 120° cone	30.8%
In 90° cone	17.8%

C planes

C000-C180
C090-C270

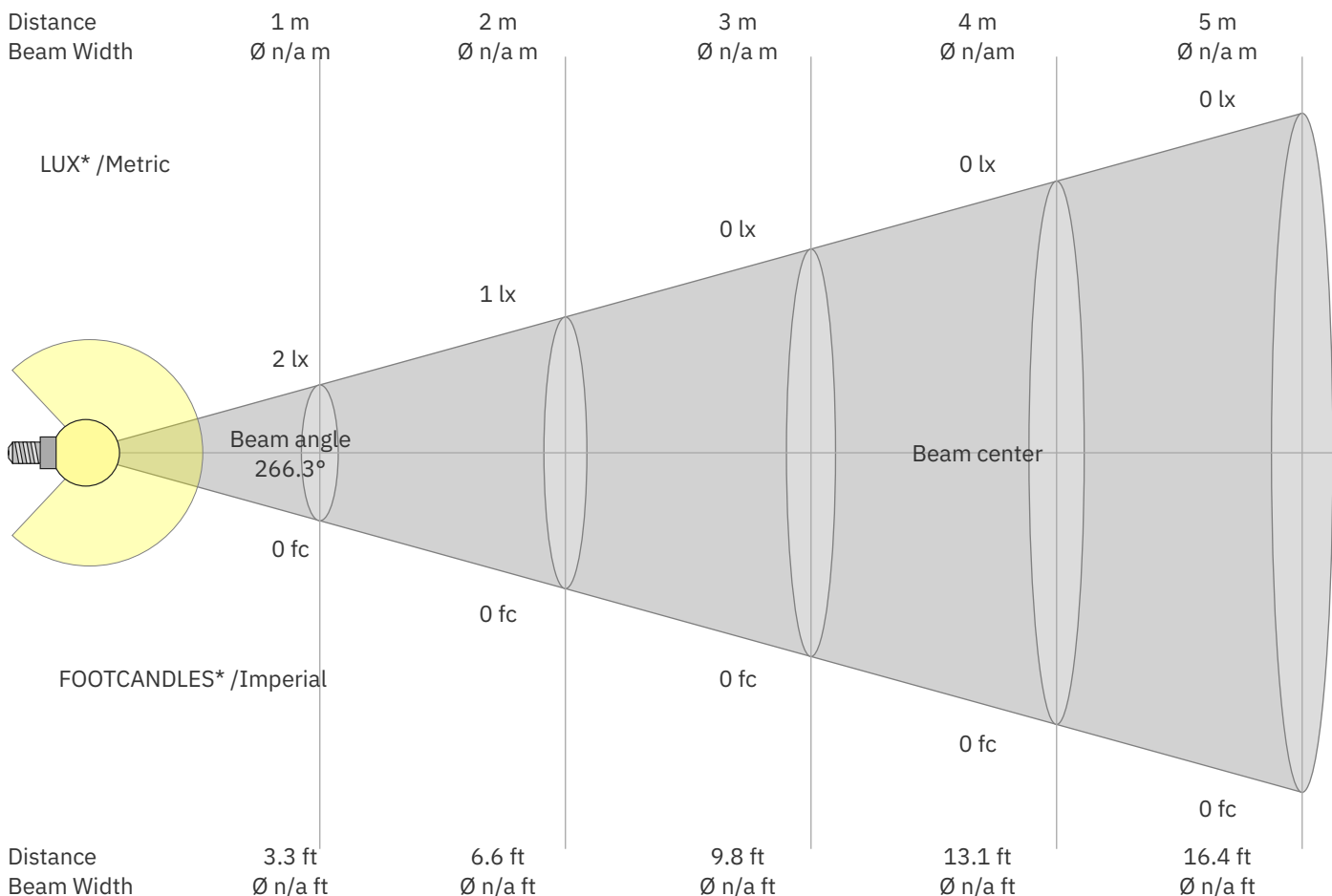
Linear distribution diagram - Intensity (candela) vs γ-angle



Document revision date: 3-7-2025 Measurement serial: VFR-250630-9923-SW

165-039 LED P45 | 1 watt | warm white | 3000K | white PC cap

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
2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	lux
0.2	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	fc

Intensities in 0° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
2.17	2.18	2.20	2.24	2.28	2.30	2.32	2.33	2.31	2.25	2.14	2.00	1.82	1.61	1.36	1.11	0.86	0.63	0.40	0.18	cd
100%	100%	101%	103%	105%	106%	107%	107%	106%	104%	99%	92%	84%	74%	63%	51%	40%	29%	19%	8%	of 0°val

Intensities in 90° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
2.17	2.18	2.20	2.24	2.28	2.30	2.32	2.33	2.31	2.25	2.14	2.00	1.82	1.61	1.36	1.11	0.86	0.63	0.40	0.18	cd
100%	100%	101%	103%	105%	106%	107%	107%	106%	104%	99%	92%	84%	74%	63%	51%	40%	29%	19%	8%	of 0°val

Intensities in 180° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
2.17	2.18	2.20	2.24	2.28	2.30	2.32	2.33	2.31	2.25	2.14	2.00	1.82	1.61	1.36	1.11	0.86	0.63	0.40	0.18	cd
100%	100%	101%	103%	105%	106%	107%	107%	106%	104%	99%	92%	84%	74%	63%	51%	40%	29%	19%	8%	of 0°val

Intensities in 270° c-plane

0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°	99°	108°	117°	126°	135°	144°	153°	162°	171°	γ
2.17	2.18	2.20	2.24	2.28	2.30	2.32	2.33	2.31	2.25	2.14	2.00	1.82	1.61	1.36	1.11	0.86	0.63	0.40	0.18	cd
100%	100%	101%	103%	105%	106%	107%	107%	106%	104%	99%	92%	84%	74%	63%	51%	40%	29%	19%	8%	of 0°val



165-039 LED P45 | 1 watt | warm white | 3000K | white PC cap

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	11.2	12.3	12.0	13.1	14.1	11.2	12.3	12.0	13.1	14.1
	3H	13.6	14.6	14.5	15.4	16.4	13.6	14.6	14.5	15.4	16.4
	4H	14.9	15.8	15.7	16.6	17.6	14.9	15.8	15.7	16.6	17.6
	6H	16.1	16.9	16.9	17.8	18.8	16.1	16.9	16.9	17.8	18.8
	8H	16.7	17.6	17.5	18.4	19.4	16.7	17.6	17.5	18.4	19.4
	12H	17.2	18.2	18.0	18.9	19.9	17.2	18.2	18.0	18.9	19.9
4H	2H	12.1	13.0	12.9	13.8	14.8	12.1	13.0	12.9	13.8	14.8
	3H	14.7	15.7	15.5	16.4	17.4	14.7	15.7	15.5	16.4	17.4
	4H	16.0	17.2	16.9	17.7	18.8	16.0	17.2	16.9	17.7	18.8
	6H	17.3	18.1	18.2	18.9	19.9	17.3	18.1	18.2	18.9	19.9
	8H	18.0	18.6	18.9	19.5	20.5	18.0	18.6	18.9	19.5	20.5
	12H	18.7	19.2	19.5	20.1	21.1	18.7	19.2	19.5	20.1	21.1
8H	4H	16.5	17.1	17.4	18.0	19.0	16.5	17.1	17.4	18.0	19.0
	6H	18.1	18.6	19.0	19.6	20.6	18.1	18.6	19.0	19.6	20.6
	8H	18.9	19.4	19.8	20.3	21.5	18.9	19.4	19.8	20.3	21.5
	12H	19.7	20.1	20.7	21.1	22.1	19.7	20.1	20.7	21.1	22.1
12H	4H	16.6	17.1	17.5	18.1	19.1	16.6	17.1	17.5	18.1	19.1
	6H	18.3	18.7	19.2	19.7	20.8	18.3	18.7	19.2	19.7	20.8
	8H	19.2	19.6	20.1	20.5	21.6	19.2	19.6	20.1	20.5	21.6
Variations with the observer position for the luminaire spacings. S:											
S = 1.0H				0.1 / 0.0				0.1 / 0.0			
S = 1.5H				0.1 / -0.1				0.1 / -0.1			
S = 2.0H				0.1 / -0.2				0.1 / -0.2			

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	110	110	110	110	103	103	103	103	90	90	90	78	78	78	67	67	67	62
1	95	89	83	77	88	83	77	73	71	67	63	61	57	54	51	49	46	41
2	85	75	66	59	78	69	62	56	60	54	49	50	46	42	42	38	35	31
3	76	64	55	47	70	60	51	44	51	44	39	43	38	33	36	32	28	24
4	69	56	46	39	64	52	43	36	44	37	32	38	32	27	31	27	23	19
5	63	49	40	32	58	46	37	30	39	32	27	33	27	23	28	23	19	16
6	58	44	34	28	53	41	32	26	35	28	23	30	24	19	25	20	16	13
7	53	39	30	24	49	37	28	22	32	25	20	27	21	17	22	18	14	11
8	49	35	27	21	46	33	25	19	29	22	17	24	19	15	20	16	12	10
9	46	32	24	18	42	30	22	17	26	20	15	22	17	13	19	14	11	9
10	43	29	21	16	40	28	20	15	24	18	13	21	15	12	17	13	10	8