



PHOTOMETRIC LIGHT REPORT

**Track spot | 3-phase |
black | 20W | 925-927-930
| 45° | dim**

Article number: 169-296



Go to the
webshop
of Tronix
Lighting



TRONIX



169-296 Track spot | 3-phase | black | 20W | 925-927-930 | 45° | dim

Introduction

Purpose of this Document

This document provides accurate and objective photometric data for Tronix Lighting item 169-296. 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 169-296 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 169-296 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.

169-296 Track spot | 3-phase | black | 20W | 925-927-930 | 45° | dim

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	Vitrek 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	19.2 W – PF 0.98 – DPF 1.0
Frequency of Input Power	50 Hz
Warm-up Time and Variation	n/a – n/a%

Tested light source

Manufacturer and Order Code	Tronix Lighting – 169-296
Product Description	Track spot 3-phase black 20W 925-927-930 45° dim

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	1332 lm – 0.32% / 99.68%
Efficiency	70 lm/W
Energy efficiency class	G
Peak Intensity and Beam Angle	2017 cd – 46°
Correlated Colour Temperature	CCT = 2681 K
Colour Shift. CIE duv	Duv -0.0016
Colour Rendering Index	CRI 94.6
Colour Rendering TM30-18	R _f 92.8 – R _g 100.1
Television Lighting Consistency Index	TLCI = 92
Flicker	SVM 0 – PstLM 0.18

169-296 Track spot | 3-phase | black | 20W | 925-927-930 | 45° | dim

Electrical measurement details

Input Power

RMS Input voltage feed. V_{RMS}

230 V

RMS Input current feed. I_{RMS}

0.085 A

Total input power

19.2 W

Frequency of input power

50 Hz

Power factor

0.98

Displacement power factor

1.0

Total harmonic distortion of the current

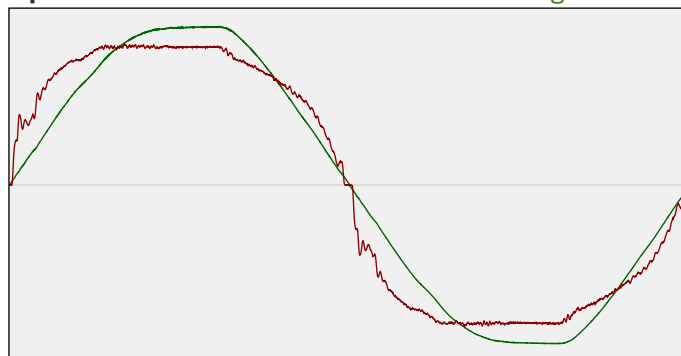
17.88%

Total harmonic distortion of the voltage

2.94%

Input Power Curve

Voltage - Current



Efficiency

Radiated power efficiency: 25.0%



Lumen efficiency: 70 lm/W



Harmonics

3rd Harmonic

16.38%

5th Harmonic

5.77%

7th Harmonic

2.93%

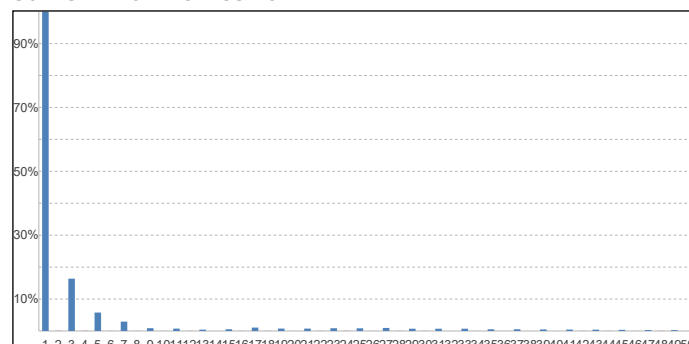
9th Harmonic

0.88%

11th Harmonic

0.74%

Current Harmonics %



Stabilization Details

Warm-up Conditions

Stable period

n/a CCT start

n/a K

Stable change max

n/a% CCT shift

n/a K

Minimum warm-up time

n/a CCT end

2681 K

Warm-up Results

Total warmup time

n/a Output start

n/a lm

Warmup variation

n/a% Output change

n/a lm

Output intensity change during warm-up

Output end

1332 lm

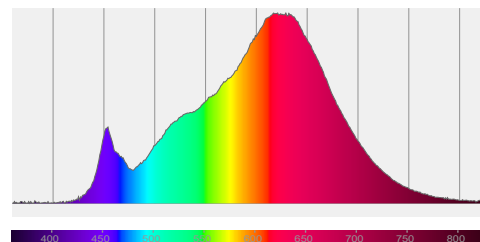
169-296 Track spot | 3-phase | black | 20W | 925-927-930 | 45° | dim

Colour measurement details

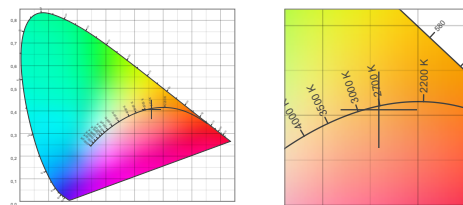
Total lumen output 1332 lm
 Correlated Colour Temperature 2681 K
 Colour coordinates CIE 1931 (x;y) = (0.459;0.406)
 Colour deviation from BBL Duv = -0.0016

TM30-18 Colour Fidelity Index R_f 92.8
 TM30-18 Colour Gamut Index R_g 100.1
 Colour Rendering Index (Ra) CRI 94.6
 Colour Rendering Index. (red component) $R_9 = 64.7$

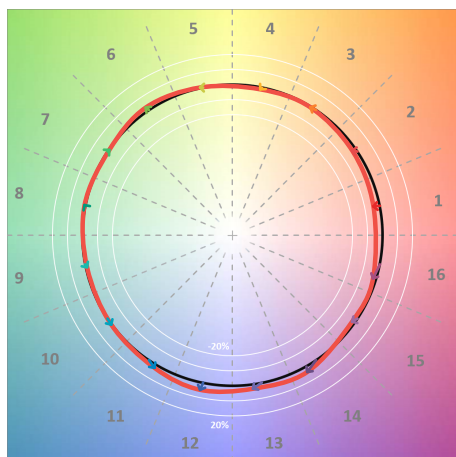
Colour Quality Scale CQS = 91.5
 Television Lighting Consistency Index TLCI = 92



Relative spectral power distribution



TM30 details

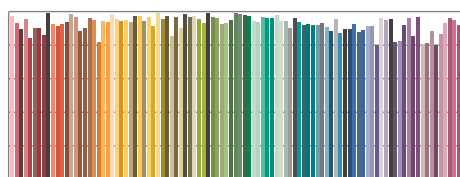


TM30 Colour vectors per hue bin

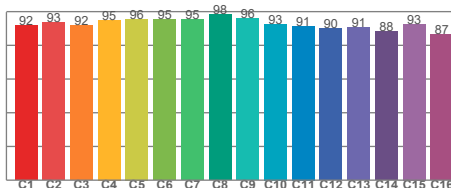


TM30 Colour distortion

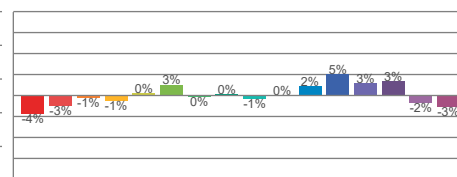
Hue Bin	R_f	Shifts (%)	
		Chroma	Hue
C1	92	-4%	0%
C2	93	-3%	3%
C3	92	-1%	4%
C4	95	-1%	1%
C5	96	0%	2%
C6	95	3%	1%
C7	95	0%	-2%
C8	98	0%	0%
C9	96	-1%	2%
C10	93	0%	5%
C11	91	2%	6%
C12	90	5%	-1%
C13	91	3%	-7%
C14	88	3%	-9%
C15	93	-2%	-4%
C16	87	-3%	-10%



TM30-18 R_f -values per reference colour

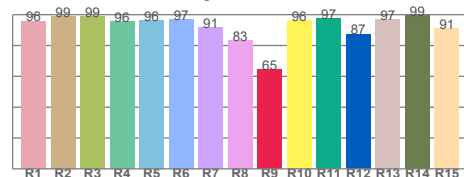


TM30-18 R_f -values per hue bin

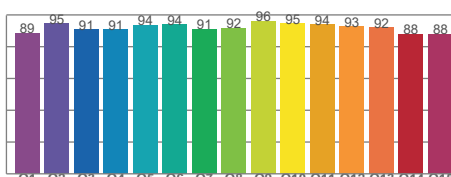


TM30 Chroma shift

Colour Quality details



Colour Rendering Index



Colour Quality Scale

169-296 Track spot | 3-phase | black | 20W | 925-927-930 | 45° | dim

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)

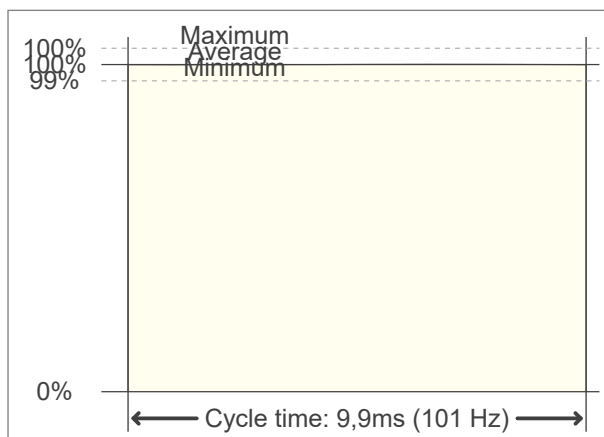
Flicker frequency	101.01 Hz
Percent flicker	0.28 %
Flicker index	0

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

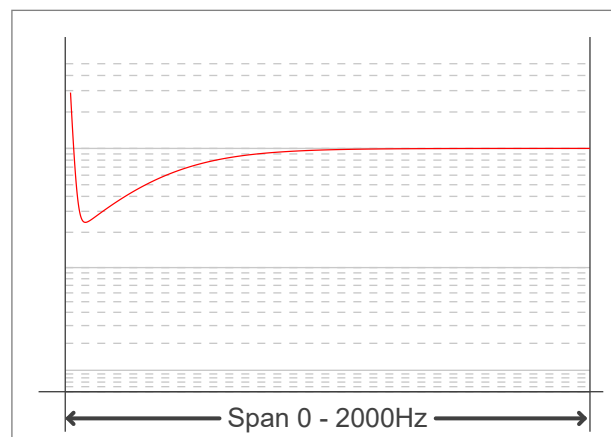
An LED luminaire is considered flicker-free if the SVM value is ≤ 0.4 and if the PstLM value is ≤ 1.0

PstLM value ($F < 80$ Hz)	0.18
SVM value ($80 < F < 2000$ Hz)	0

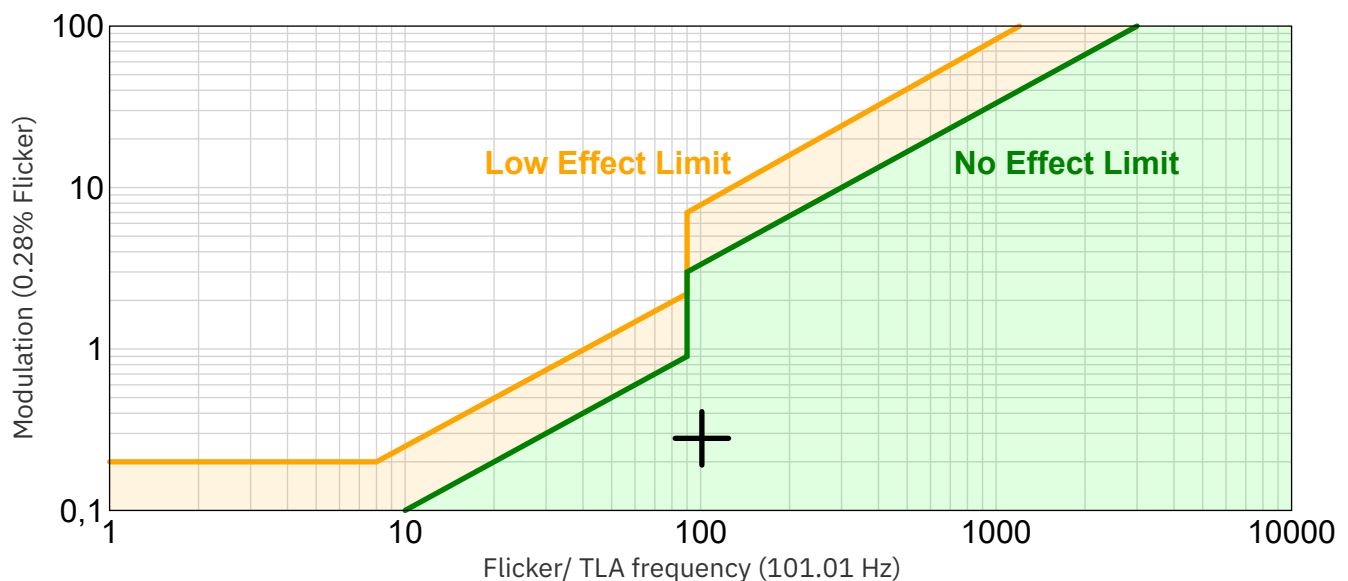
Flicker frame (one flicker period in time domain)



Flicker FFT (flicker curve in frequency domain)



IEEE 1789-2015 Lighting Flicker Risk Zones



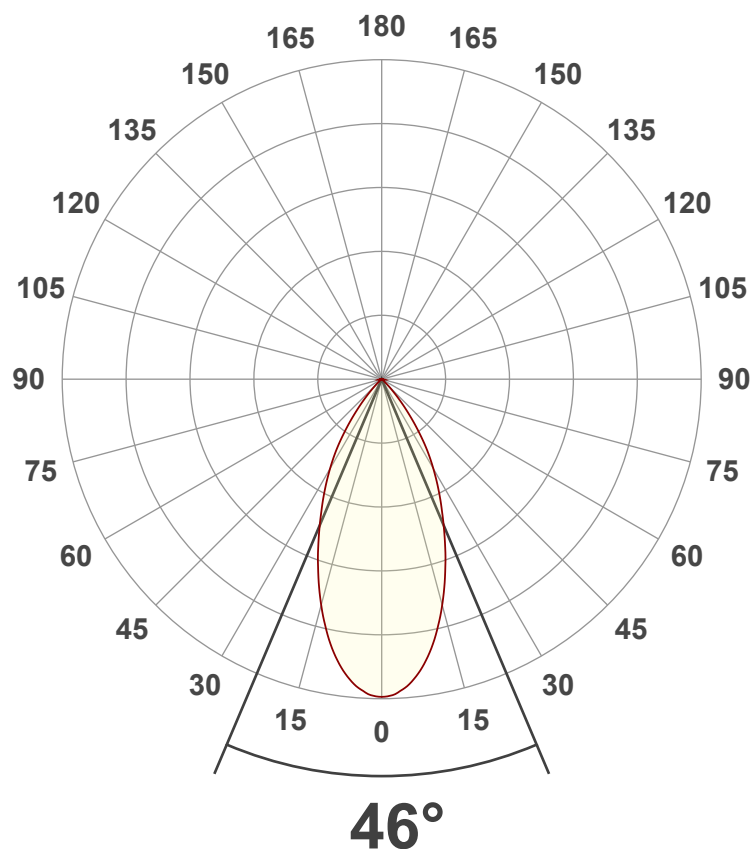
Document revision date: 1-7-2025 Measurement serial: VFR-250117-0142-MS

169-296 Track spot | 3-phase | black | 20W | 925-927-930 | 45° | dim

Beam angle

Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	1332 lm
Lumen Up/Down	0.32% / 99.68%
Peak Intensity	2017 cd
Beam Angle (50%)	46°
Beam Angle (90%)	46°
Beam Angle (10%)	46°

Cut-off Angle

Average 2.5%	91.6°
--------------	-------

Field Angle

Average 10%	80°
-------------	-----

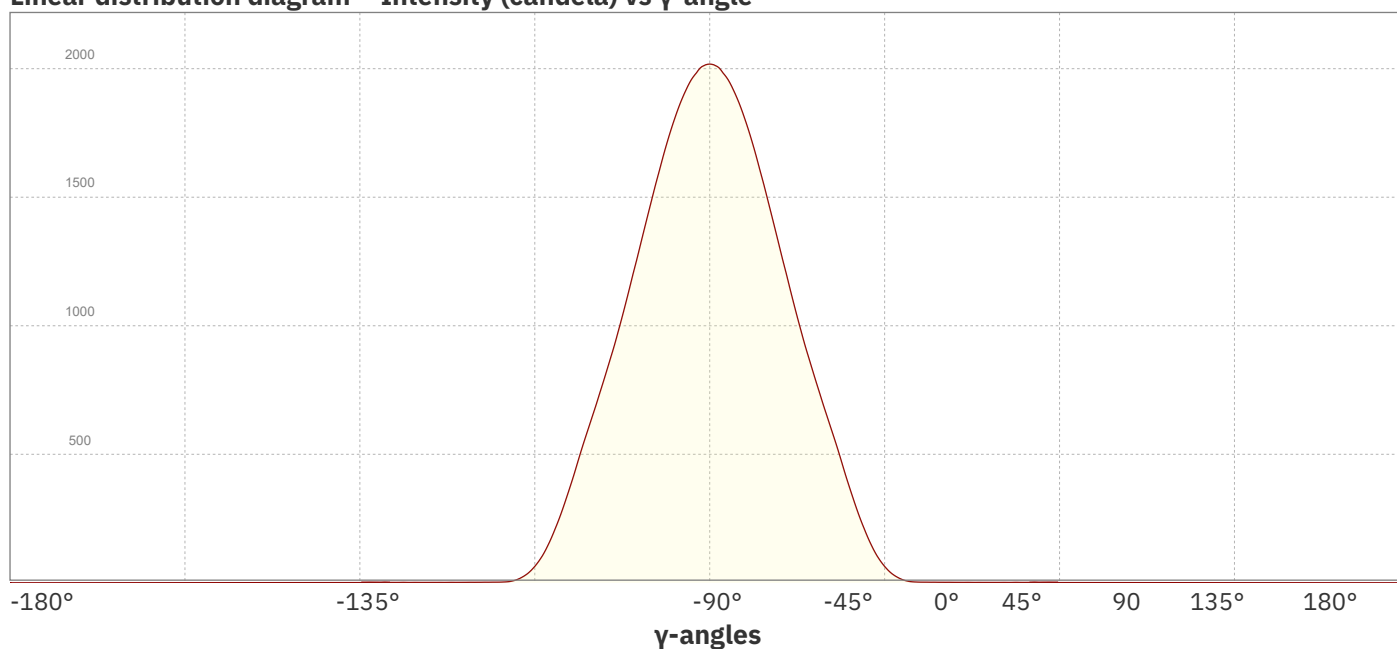
Intensity Ratio

In 120° cone	99.3%
In 90° cone	98.1%

C planes

C000-C180
C090-C270

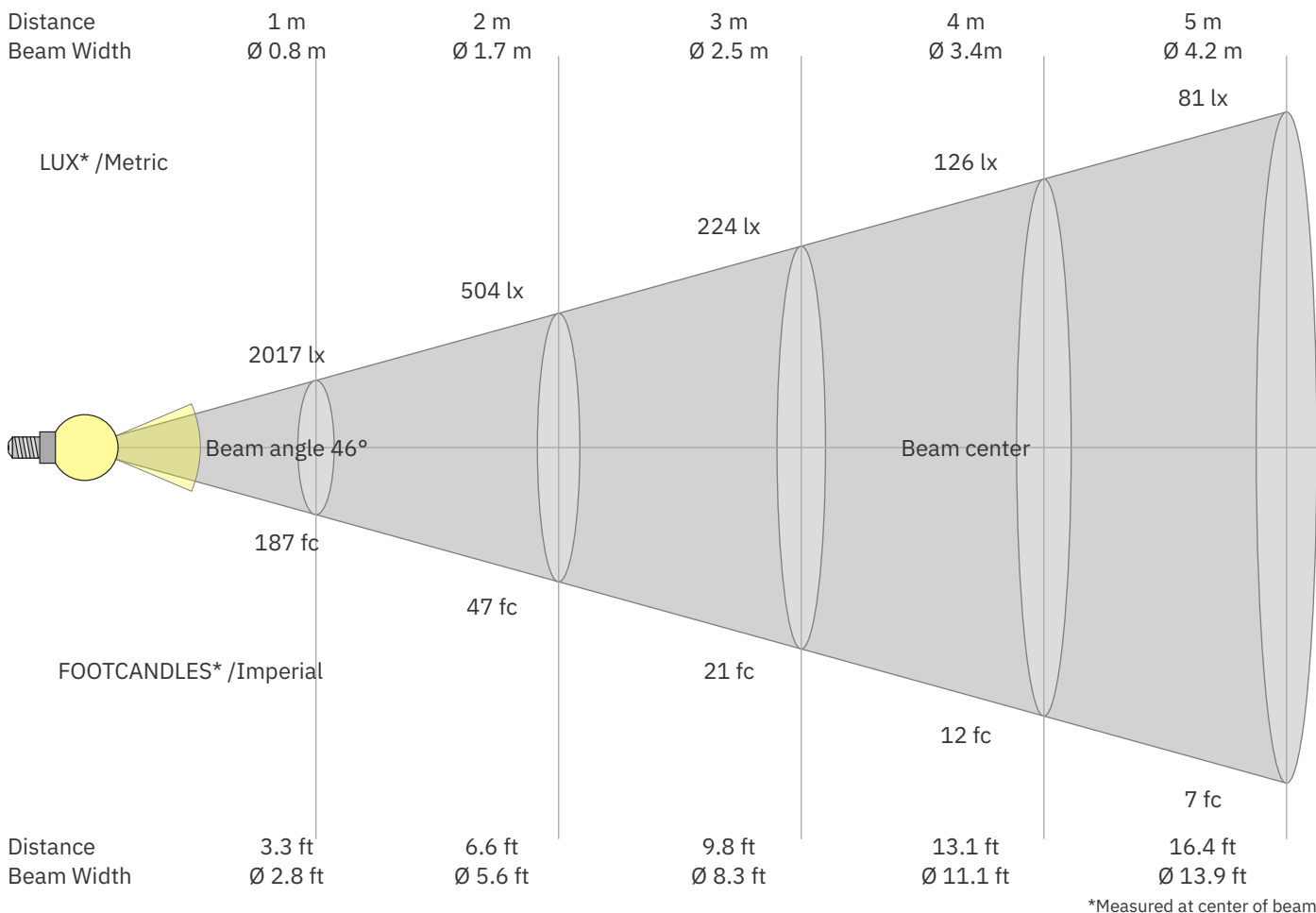
Linear distribution diagram - Intensity (candela) vs γ-angle



Document revision date: 1-7-2025 Measurement serial: VFR-250117-0142-MS

169-296 Track spot | 3-phase | black | 20W | 925-927-930 | 45° | dim

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
2017	504	224	126	81	56	41	32	25	20	17	14	12	10	9	8	7	6	6	5	lux
187.4	46.8	20.8	11.7	7.5	5.2	3.8	2.9	2.3	1.9	1.5	1.3	1.1	1	0.8	0.7	0.6	0.6	0.5	0.5	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
2017	2007	1972	1920	1849	1760	1657	1544	1425	1304	1184	1064	952	849	751	656	564	467	369	279	cd
100%	99%	98%	95%	92%	87%	82%	77%	71%	65%	59%	53%	47%	42%	37%	33%	28%	23%	18%	14%	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
2017	2007	1972	1920	1849	1760	1657	1544	1425	1304	1184	1064	952	849	751	656	564	467	369	279	cd
100%	99%	98%	95%	92%	87%	82%	77%	71%	65%	59%	53%	47%	42%	37%	33%	28%	23%	18%	14%	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
2017	2007	1972	1920	1849	1760	1657	1544	1425	1304	1184	1064	952	849	751	656	564	467	369	279	cd
100%	99%	98%	95%	92%	87%	82%	77%	71%	65%	59%	53%	47%	42%	37%	33%	28%	23%	18%	14%	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
2017	2007	1972	1920	1849	1760	1657	1544	1425	1304	1184	1064	952	849	751	656	564	467	369	279	cd
100%	99%	98%	95%	92%	87%	82%	77%	71%	65%	59%	53%	47%	42%	37%	33%	28%	23%	18%	14%	of 0°val

Document revision date: 1-7-2025 Measurement serial: VFR-250117-0142-MS

169-296 Track spot | 3-phase | black | 20W | 925-927-930 | 45° | dim

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	20.9	21.5	21.0	21.7	21.9	20.9	21.5	21.0	21.7	21.9
	3H	20.6	21.3	20.9	21.5	21.7	20.6	21.3	20.9	21.5	21.7
	4H	20.5	21.2	20.9	21.4	21.7	20.5	21.2	20.9	21.4	21.7
	6H	20.5	21.1	20.8	21.4	21.7	20.5	21.1	20.8	21.4	21.7
	8H	20.5	21.0	20.8	21.3	21.7	20.5	21.0	20.8	21.3	21.7
	12H	20.4	21.0	20.8	21.3	21.7	20.4	21.0	20.8	21.3	21.7
4H	2H	20.5	21.2	20.9	21.4	21.7	20.5	21.2	20.9	21.4	21.7
	3H	20.4	20.9	20.7	21.3	21.7	20.4	20.9	20.7	21.3	21.7
	4H	20.2	20.7	20.7	21.2	21.7	20.2	20.7	20.7	21.2	21.7
	6H	20.2	20.7	20.7	21.1	21.4	20.2	20.7	20.7	21.1	21.4
	8H	20.1	20.6	20.7	21.0	21.3	20.1	20.6	20.7	21.0	21.3
	12H	20.1	20.5	20.6	20.9	21.4	20.1	20.5	20.6	20.9	21.4
8H	4H	20.1	20.6	20.6	20.9	21.3	20.1	20.6	20.6	20.9	21.3
	6H	20.1	20.4	20.6	20.9	21.4	20.1	20.4	20.6	20.9	21.4
	8H	20.1	20.4	20.6	20.9	21.5	20.1	20.4	20.6	20.9	21.5
	12H	20.1	20.3	20.7	20.8	21.4	20.1	20.3	20.7	20.8	21.4
12H	4H	20.1	20.4	20.6	20.8	21.3	20.1	20.4	20.6	20.8	21.3
	6H	20.1	20.3	20.6	20.9	21.5	20.1	20.3	20.6	20.9	21.5
	8H	20.0	20.3	20.6	20.8	21.4	20.0	20.3	20.6	20.8	21.4
Variations with the observer position for the luminaire spacings. S:											
S = 1.0H		5.0 / -9.8					5.0 / -9.8				
S = 1.5H		7.6 / -10.1					7.6 / -10.1				
S = 2.0H		9.6 / -10.3					9.6 / -10.3				

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	97	96	95	94
2	108	104	100	97	106	102	99	96	99	96	93	96	93	91	93	91	89	88
3	103	97	92	89	101	96	91	88	93	90	87	91	88	85	88	86	84	82
4	98	91	86	82	97	90	85	82	88	84	81	86	82	80	84	81	79	77
5	94	86	80	76	92	85	80	76	83	79	75	81	78	75	80	77	74	72
6	89	81	75	71	88	80	75	71	79	74	70	77	73	70	76	72	70	68
7	85	77	71	67	84	76	70	67	75	70	66	73	69	66	72	68	66	64
8	81	72	67	63	80	72	66	63	71	66	62	70	65	62	69	65	62	61
9	78	69	63	59	77	68	63	59	67	62	59	66	62	59	66	62	59	57
10	74	65	60	56	73	65	60	56	64	59	56	63	59	56	63	58	56	54