



PHOTOMETRIC LIGHT REPORT

LED spot | downlight | 700mA | 2.5W | black | 6500K

Article number: 148-171



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TRONIX



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Introduction

Purpose of this Document

This document provides accurate and objective photometric data for Tronix Lighting item 148-171. 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 148-171 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 148-171 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	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	1.14 m
Room Temperature and Humidity	22°C +/- 10% – RH 50% +/- 20%
Input Power. Power and Displacement Factors	2.4 W – PF 1.0 – DPF 0.44
Frequency of Input Power	0 Hz
Warm-up Time and Variation	Lamp stabilized in 16 min 12 sec --2.4%

Tested light source

Manufacturer and Order Code	Tronix Lighting – 148-171
Product Description	LED spot downlight 700mA 2.5W black 6500K Batch: F22

Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	228 lm – 0% / 100%
Efficiency	94 lm/W
Energy efficiency class	F
Peak Intensity and Beam Angle	459 cd – 36.5°
Correlated Colour Temperature	CCT = 5897 K
Colour Shift. CIE duv	Duv -0.0062
Colour Rendering Index	CRI 72.1
Colour Rendering TM30-18	R _f 68.3 – R _g 100.4
Television Lighting Consistency Index	TLCI = 48
Flicker	SVM n/a – PstLM n/a



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Electrical measurement details

Input Power

RMS Input voltage feed. V_{RMS}	3.47 V
RMS Input current feed. I_{RMS}	0.700 A
Total input power	2.4 W
Frequency of input power	0 Hz
Power factor	1.0
Displacement power factor	0.44
Total harmonic distortion of the current	0%
Total harmonic distortion of the voltage	0%

Input Power Curve

Voltage - Current



Efficiency

Radiated power efficiency: 30.5%



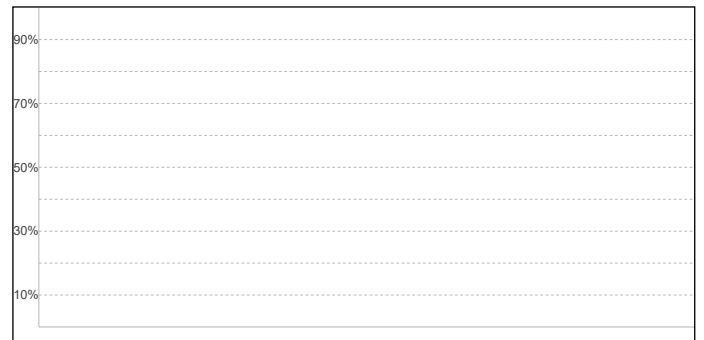
Lumen efficiency: 94 lm/W



Harmonics

3rd Harmonic	n/a
5th Harmonic	n/a
7th Harmonic	n/a
9th Harmonic	n/a
11th Harmonic	n/a

Current Harmonics %



Stabilization Details

Warm-up Conditions

Stable period	15 min	Colour temperature change during warm-up	CCT start	5926 K
Stable change max	2.0%		CCT shift	-29 K
Minimum warm-up time	15 min		CCT end	5897 K

Warm-up Results

Total warmup time	Lamp stabilized in 16 min 12 sec	Output intensity change during warm-up	Output start	233 lm
Warmup variation	-2.4%		Output change	-6 lm
			Output end	228 lm



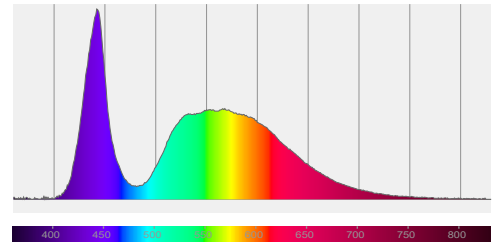
148-171 LED spot | downlight | 700mA | 2.5W | black | 6500K

Colour measurement details

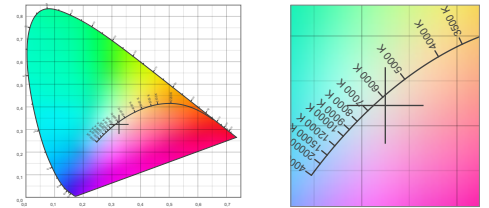
Total lumen output: 228 lm
 Correlated Colour Temperature: 5897 K
 Colour coordinates CIE 1931: (x;y) = (0.325;0.323)
 Colour deviation from BBL: Duv = -0.0062

TM30-18 Colour Fidelity Index: R_f 68.3
 TM30-18 Colour Gamut Index: R_g 100.4
 Colour Rendering Index (Ra): CRI 72.1
 Colour Rendering Index. (red component): R9 = -3.3

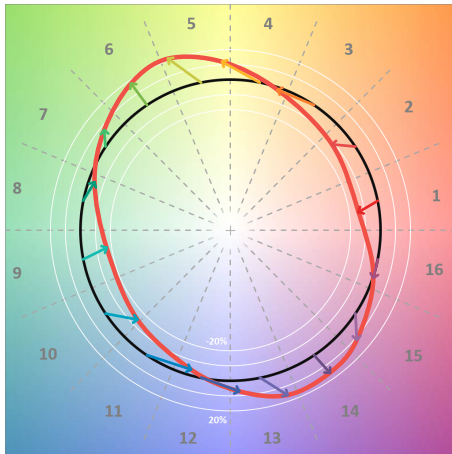
Colour Quality Scale: CQS = 69.5
 Television Lighting Consistency Index: TLCI = 48



Relative spectral power distribution



TM30 details

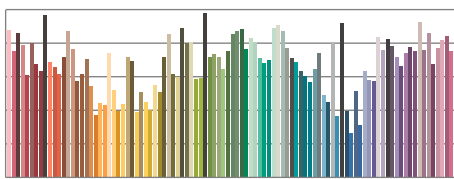


TM30 Colour vectors per hue bin

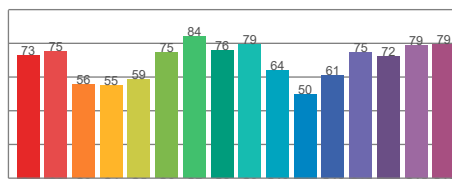


TM30 Colour distortion

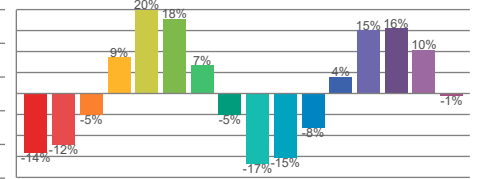
Hue Bin	R _f	Shifts (%)	
		Chroma	Hue
C1	73	-14%	-5%
C2	75	-12%	10%
C3	56	-5%	26%
C4	55	9%	27%
C5	59	20%	19%
C6	75	18%	1%
C7	84	7%	-9%
C8	76	-5%	-14%
C9	79	-17%	-5%
C10	64	-15%	15%
C11	50	-8%	30%
C12	61	4%	27%
C13	75	15%	16%
C14	72	16%	2%
C15	79	10%	-14%
C16	79	-1%	-13%



TM30-18 R_f-values per reference colour

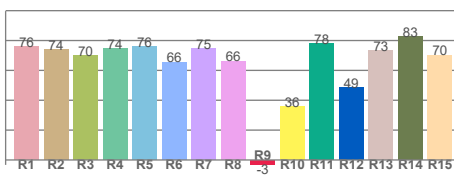


TM30-18 R_f-values per hue bin

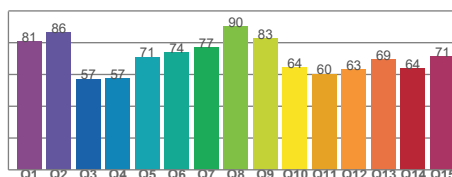


TM30 Chroma shift

Colour Quality details



Colour Rendering Index



Colour Quality Scale

Document revision date: 1-7-2025 Measurement serial: VFR-250624-9836-SW



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Flicker / temporal light artefacts details

Measurement conditions

Flicker meter type	Viso Systems LabFlicker
Flicker/TLA sample rate	n/a 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	n/a Hz
Percent flicker	n/a %
Flicker index	n/a

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

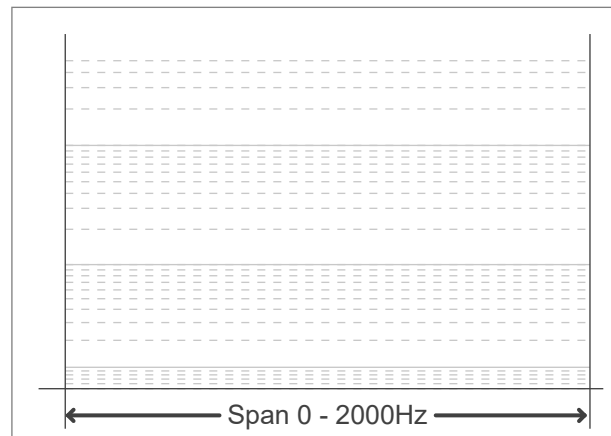
An LED luminaire is considered flicker-free if the SVM value is ≤ 0.4 and if the PstLM value is ≤ 1.0

PstLM value ($F < 80$ Hz)	n/a
SVM value ($80 < F < 2000$ Hz)	n/a

Flicker frame (one flicker period in time domain)



Flicker FFT (flicker curve in frequency domain)



IEEE 1789-2015 Lighting Flicker Risk Zones



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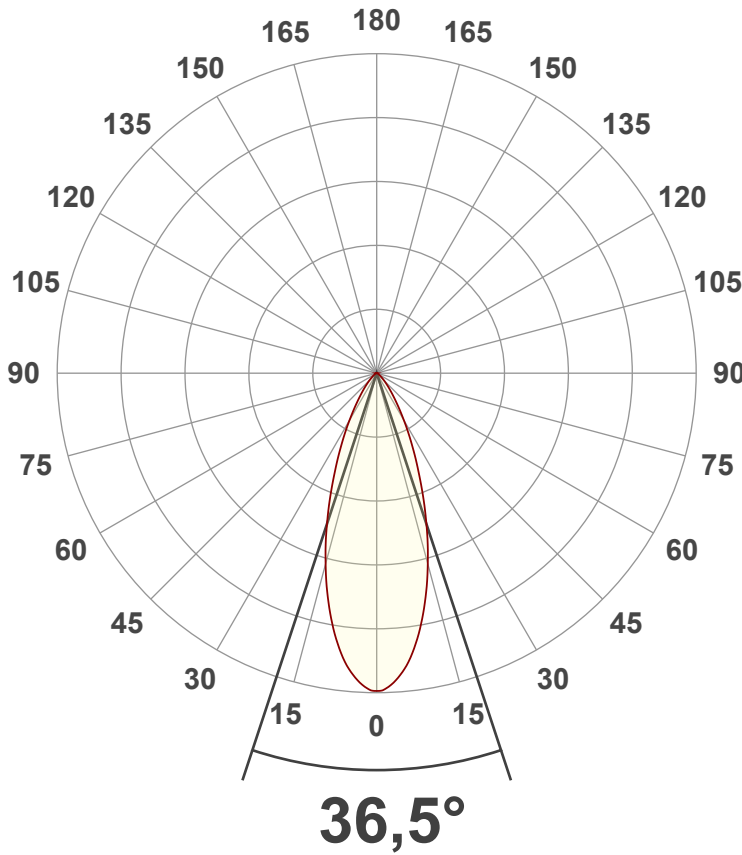


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Beam angle

Luminous Intensity diagram

Unit: 0-100% of peak intensity



Main Values

Output (total Lumen)	228 lm
Lumen Up/Down	0% / 100%
Peak Intensity	459 cd
Beam Angle (50%)	36.5°
Beam Angle (90%)	36.5°
Beam Angle (10%)	36.5°

Cut-off Angle

Average 2.5%	95.3°
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Field Angle

Average 10%	69.9°
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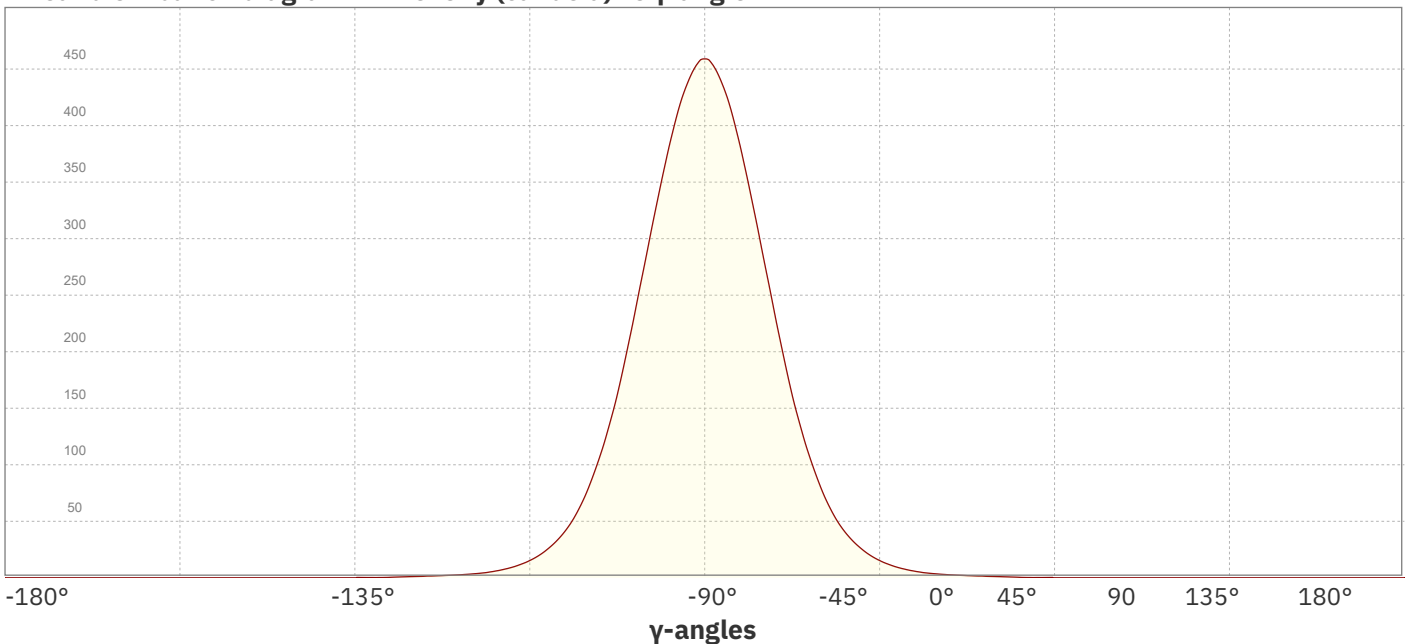
Intensity Ratio

In 120° cone	98.3%
In 90° cone	94.1%

C planes

- C000-C180
- C090-C270

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

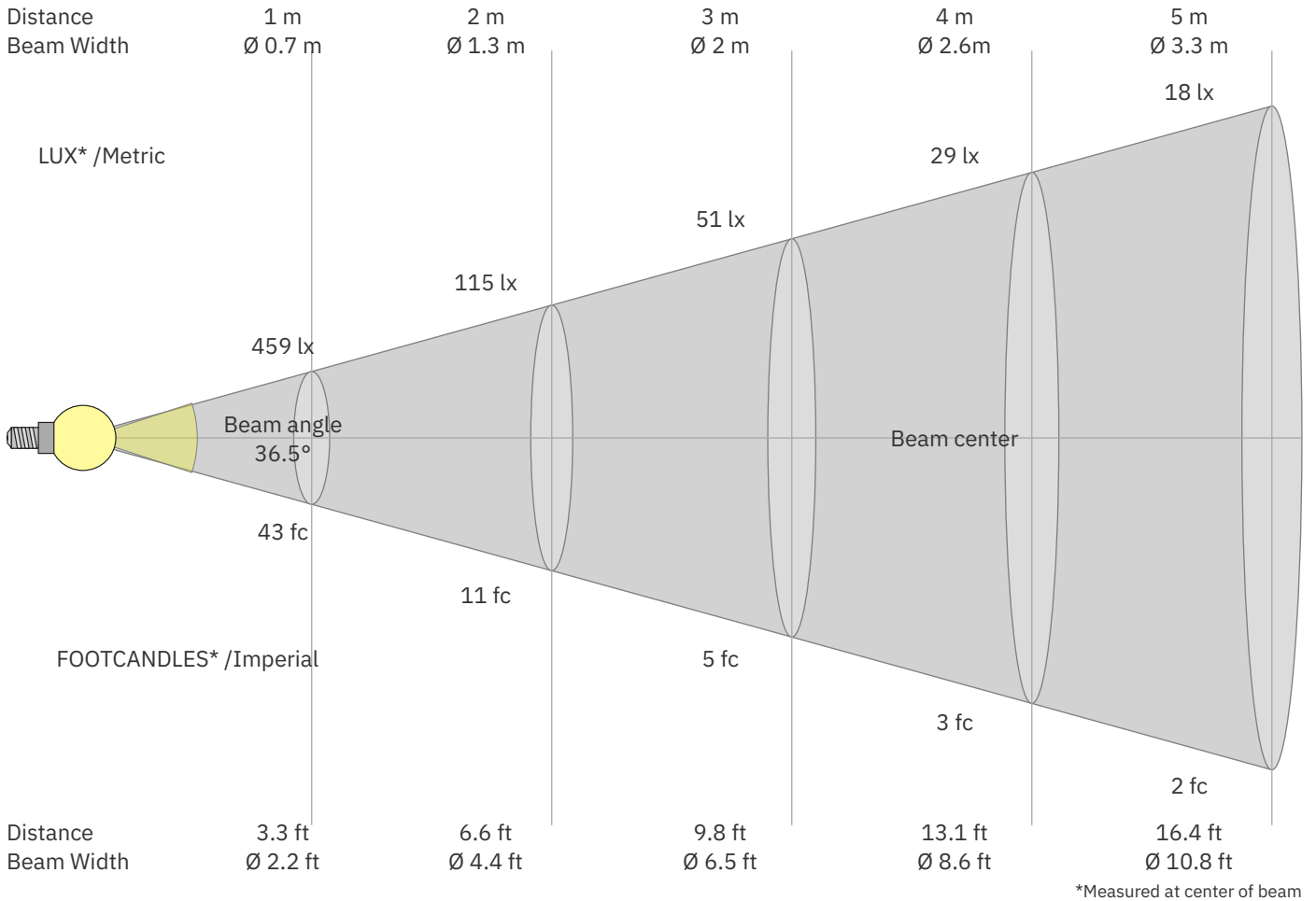


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Beam Details



*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
459	115	51	29	18	13	9	7	6	5	4	3	3	2	2	2	2	1	1	1	lux
42.6	10.7	4.7	2.7	1.7	1.2	0.9	0.7	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	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
459	454	441	422	397	368	336	303	268	234	201	169	142	118	97	79	63	51	41	33	cd
100%	99%	96%	92%	87%	80%	73%	66%	58%	51%	44%	37%	31%	26%	21%	17%	14%	11%	9%	7%	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
459	454	441	422	397	368	336	303	268	234	201	169	142	118	97	79	63	51	41	33	cd
100%	99%	96%	92%	87%	80%	73%	66%	58%	51%	44%	37%	31%	26%	21%	17%	14%	11%	9%	7%	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
459	454	441	422	397	368	336	303	268	234	201	169	142	118	97	79	63	51	41	33	cd
100%	99%	96%	92%	87%	80%	73%	66%	58%	51%	44%	37%	31%	26%	21%	17%	14%	11%	9%	7%	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
459	454	441	422	397	368	336	303	268	234	201	169	142	118	97	79	63	51	41	33	cd
100%	99%	96%	92%	87%	80%	73%	66%	58%	51%	44%	37%	31%	26%	21%	17%	14%	11%	9%	7%	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	21.5	22.1	21.6	22.3	22.5	21.5	22.1	21.6	22.3	22.5
	3H	21.4	22.1	21.8	22.3	22.5	21.4	22.1	21.8	22.3	22.5
	4H	21.4	22.2	21.8	22.4	22.6	21.4	22.2	21.8	22.4	22.6
	6H	21.5	22.1	21.8	22.4	22.8	21.5	22.1	21.8	22.4	22.8
	8H	21.5	22.1	21.8	22.4	22.8	21.5	22.1	21.8	22.4	22.8
	12H	21.5	22.0	21.8	22.4	22.8	21.5	22.0	21.8	22.4	22.8
4H	2H	21.2	21.9	21.6	22.2	22.4	21.2	21.9	21.6	22.2	22.4
	3H	21.5	22.0	21.8	22.4	22.8	21.5	22.0	21.8	22.4	22.8
	4H	21.5	22.0	21.9	22.4	23.0	21.5	22.0	21.9	22.4	23.0
	6H	21.6	22.1	22.1	22.4	22.8	21.6	22.1	22.1	22.4	22.8
	8H	21.5	22.1	22.1	22.4	22.8	21.5	22.1	22.1	22.4	22.8
	12H	21.5	21.9	22.0	22.3	22.8	21.5	21.9	22.0	22.3	22.8
8H	4H	21.5	22.0	22.0	22.3	22.7	21.5	22.0	22.0	22.3	22.7
	6H	21.6	21.9	22.1	22.4	22.9	21.6	21.9	22.1	22.4	22.9
	8H	21.6	21.9	22.1	22.4	23.0	21.6	21.9	22.1	22.4	23.0
	12H	21.6	21.8	22.2	22.3	22.9	21.6	21.8	22.2	22.3	22.9
12H	4H	21.4	21.8	21.9	22.2	22.7	21.4	21.8	21.9	22.2	22.7
	6H	21.6	21.9	22.1	22.4	23.0	21.6	21.9	22.1	22.4	23.0
	8H	21.6	21.8	22.2	22.3	22.9	21.6	21.8	22.2	22.3	22.9

Variations with the observer position for the luminaire spacings. S:

S = 1.0H	3.0 / -2.7	3.0 / -2.7
S = 1.5H	5.2 / -3.7	5.2 / -3.7
S = 2.0H	7.0 / -4.3	7.0 / -4.3

Coefficients of Utilization

Ceiling reflectance	80	70	50	30	10	0												
Wall reflectance	70	50	30	10	70	50	30	10	50	30	10	0						
Floor reflectance	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	106	106	106	102	102	102	100	
1	114	111	109	106	111	109	107	105	105	103	102	101	100	99	98	97	96	94
2	108	104	100	97	106	102	99	96	99	96	93	96	94	92	93	91	90	88
3	103	97	93	89	101	96	92	88	93	90	87	91	88	85	89	86	84	83
4	99	92	86	82	97	90	86	82	88	84	81	86	83	80	85	82	79	78
5	94	86	81	77	93	86	80	77	84	79	76	82	78	75	81	77	75	73
6	90	82	76	72	89	81	76	72	80	75	72	78	74	71	77	73	71	69
7	86	78	72	68	85	77	72	68	76	71	68	75	70	67	74	70	67	66
8	83	74	68	65	82	73	68	64	72	68	64	71	67	64	70	67	64	62
9	79	70	65	61	78	70	65	61	69	64	61	68	64	61	67	64	61	59
10	76	67	62	58	75	67	62	58	66	61	58	65	61	58	65	61	58	57