



## PHOTOMETRIC LIGHT REPORT

# LED spot | 50mm | 350mA | 9W | alu | 2700K

Article number: 148-165



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# TRONIX



148-165 LED spot | 50mm | 350mA | 9W | alu | 2700K

## Introduction

### Purpose of this Document

This document provides accurate and objective photometric data for Tronix Lighting item 148-165. 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 148-165 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 148-165 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.



148-165 LED spot | 50mm | 350mA | 9W | alu | 2700K

### 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	1.14 m
Room Temperature and Humidity	22°C +/- 10% – RH 50% +/- 20%
Input Power. Power and Displacement Factors	9.3 W – PF 1.0 – DPF 0.44
Frequency of Input Power	0 Hz
Warm-up Time and Variation	Lamp stabilized in 23 min 51 sec --5.4%

### Tested light source

Manufacturer and Order Code	Tronix Lighting – 148-165
Product Description	LED spot   50mm   350mA   9W   alu   2700K Batch: K21

### Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	819 lm – 0% / 100%
Efficiency	88 lm/W
Energy efficiency class	F
Peak Intensity and Beam Angle	1305 cd – 37°
Correlated Colour Temperature	CCT = 2811 K
Colour Shift. CIE duv	Duv -0.0039
Colour Rendering Index	CRI 91.7
Colour Rendering TM30-18	R <sub>f</sub> 90.6 – R <sub>g</sub> 100.7
Television Lighting Consistency Index	TLCI = 87
Flicker	SVM n/a – PstLM n/a



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Electrical measurement details

**Input Power**

RMS Input voltage feed. $V_{RMS}$	26.6 V
RMS Input current feed. $I_{RMS}$	0.350 A
Total input power	9.3 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: 31.2%



Lumen efficiency: 88 lm/W



**Current Harmonics %**



**Harmonics**

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

Stabilization Details

**Warm-up Conditions**

Stable period	15 min
Stable change max	2.0%
Minimum warm-up time	15 min

**Colour temperature change during warm-up**

CCT start	2811 K
CCT shift	+0 K
CCT end	2811 K

**Warm-up Results**

Total warmup time	Lamp stabilized in 23 min 51 sec
Warmup variation	-5.4%

**Output intensity change during warm-up**

Output start	864 lm
Output change	-45 lm
Output end	819 lm



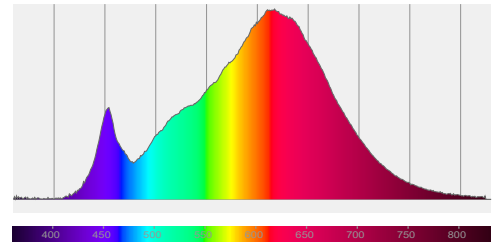
148-165 LED spot | 50mm | 350mA | 9W | alu | 2700K

## Colour measurement details

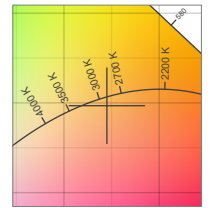
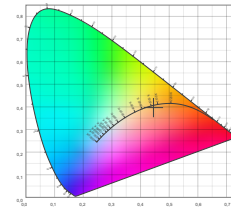
Total lumen output: 819 lm  
 Correlated Colour Temperature: 2811 K  
 Colour coordinates CIE 1931: (x;y) = (0.445;0.397)  
 Colour deviation from BBL: Duv = -0.0039

TM30-18 Colour Fidelity Index: R<sub>f</sub> 90.6  
 TM30-18 Colour Gamut Index: R<sub>g</sub> 100.7  
 Colour Rendering Index (Ra): CRI 91.7  
 Colour Rendering Index. (red component): R9 = 53.7

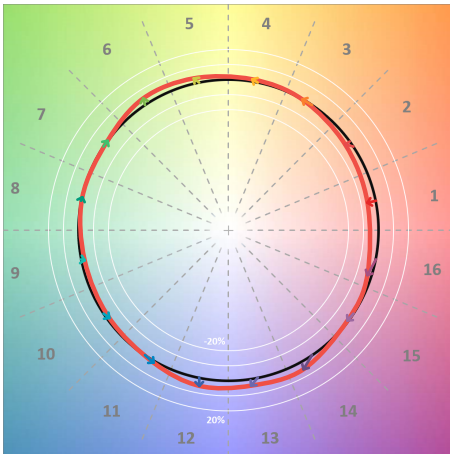
Colour Quality Scale: CQS = 88.7  
 Television Lighting Consistency Index: TLCI = 87



Relative spectral power distribution



## TM30 details

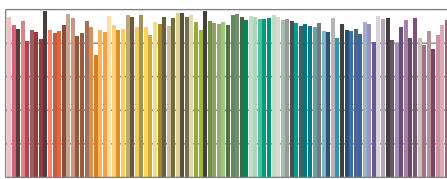


TM30 Colour vectors per hue bin

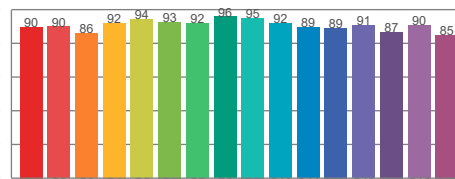


TM30 Colour distortion

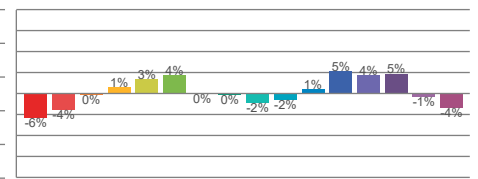
Hue Bin	R <sub>f</sub>	Shifts (%)	
		Chroma	Hue
C1	90	-6%	0%
C2	90	-4%	4%
C3	86	0%	7%
C4	92	1%	4%
C5	94	3%	3%
C6	93	4%	-2%
C7	92	0%	-5%
C8	96	0%	-2%
C9	95	-2%	1%
C10	92	-2%	5%
C11	89	1%	7%
C12	89	5%	1%
C13	91	4%	-5%
C14	87	5%	-10%
C15	90	-1%	-6%
C16	85	-4%	-11%



TM30-18 R<sub>f</sub>-values per reference colour

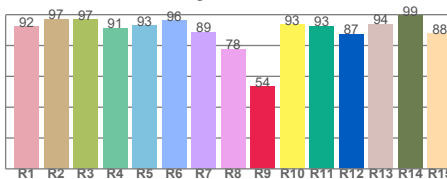


TM30-18 R<sub>f</sub>-values per hue bin

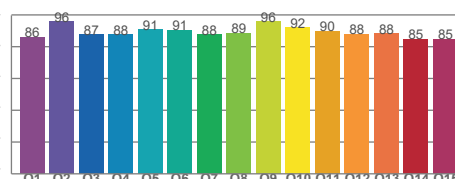


TM30 Chroma shift

## Colour Quality details



Colour Rendering Index



Colour Quality Scale

Document revision date: 1-7-2025 Measurement serial: VFR-250623-9827-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)

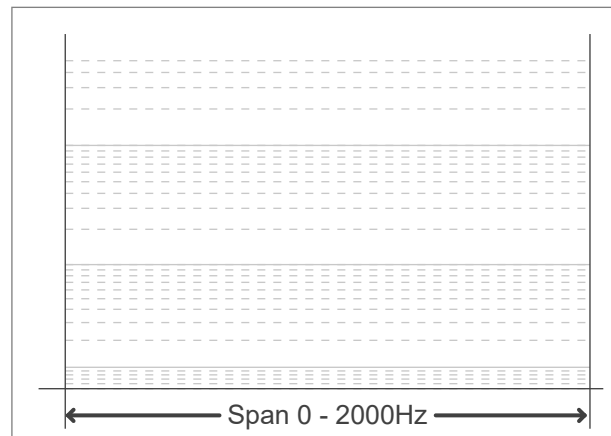
An LED luminaire is considered flicker-free if the SVM value is  $\leq 0.4$  and if the PstLM value is  $\leq 1.0$

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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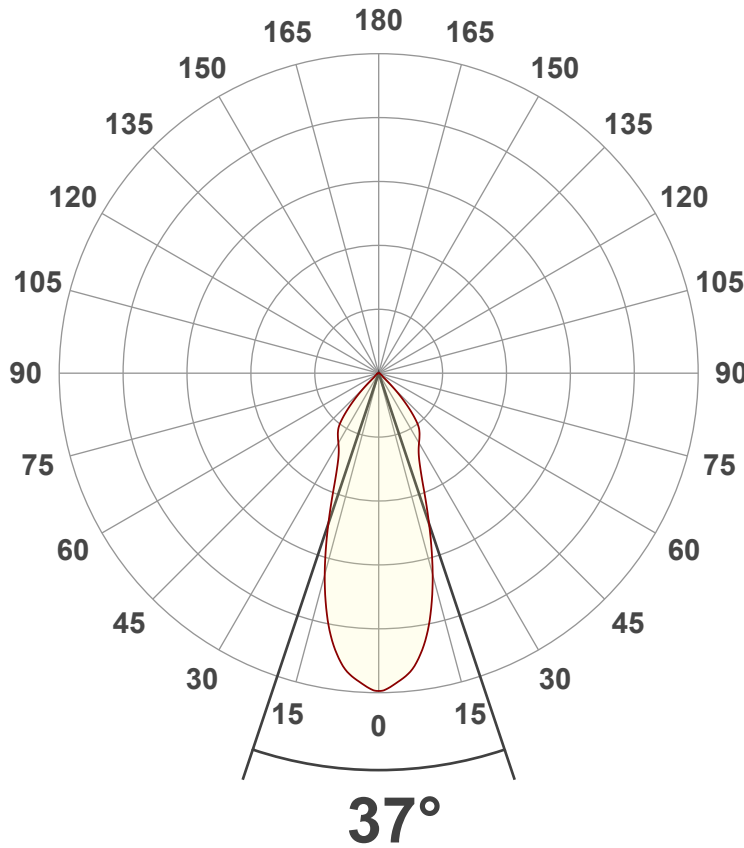


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Beam angle

**Luminous Intensity diagram**

Unit: 0-100% of peak intensity



**Main Values**

Output (total Lumen)	819 lm
Lumen Up/Down	0% / 100%
Peak Intensity	1305 cd
Beam Angle (50%)	37°
Beam Angle (90%)	37°
Beam Angle (10%)	37°

**Cut-off Angle**

Average 2.5%	96.7°
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**Field Angle**

Average 10%	86.7°
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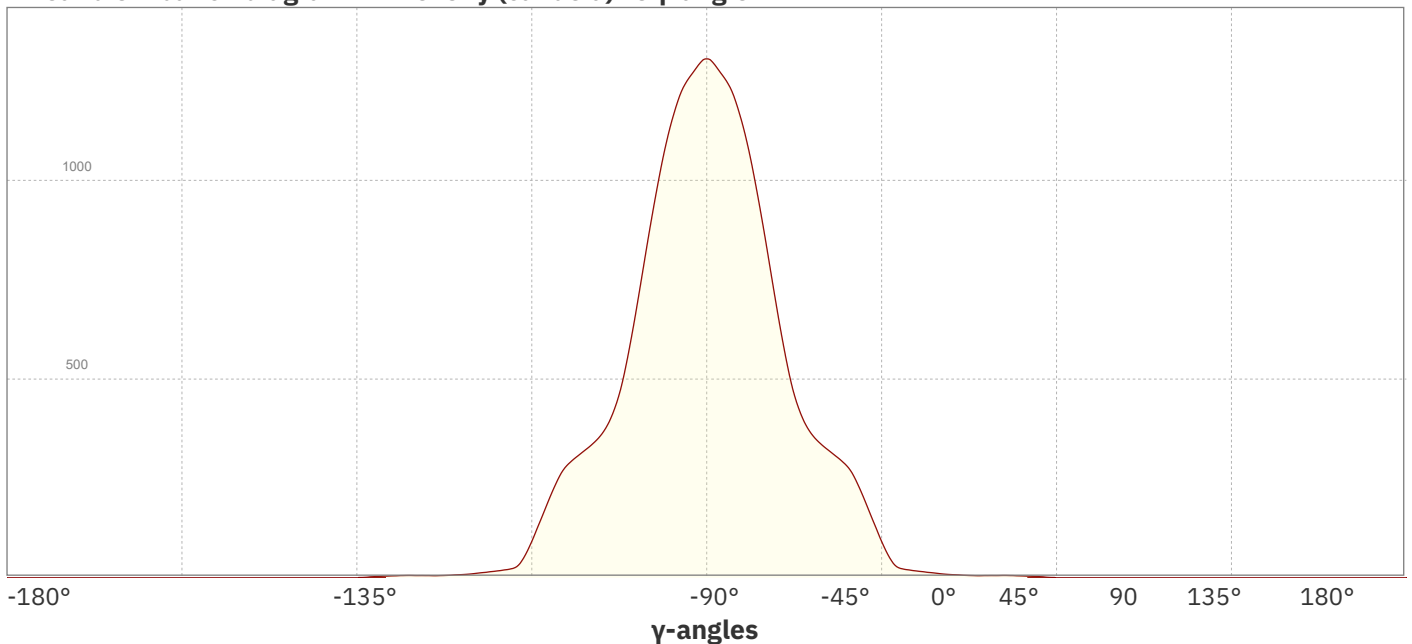
**Intensity Ratio**

In 120° cone	98.0%
In 90° cone	93.9%

**C planes**

- C000-C180
- C090-C270

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

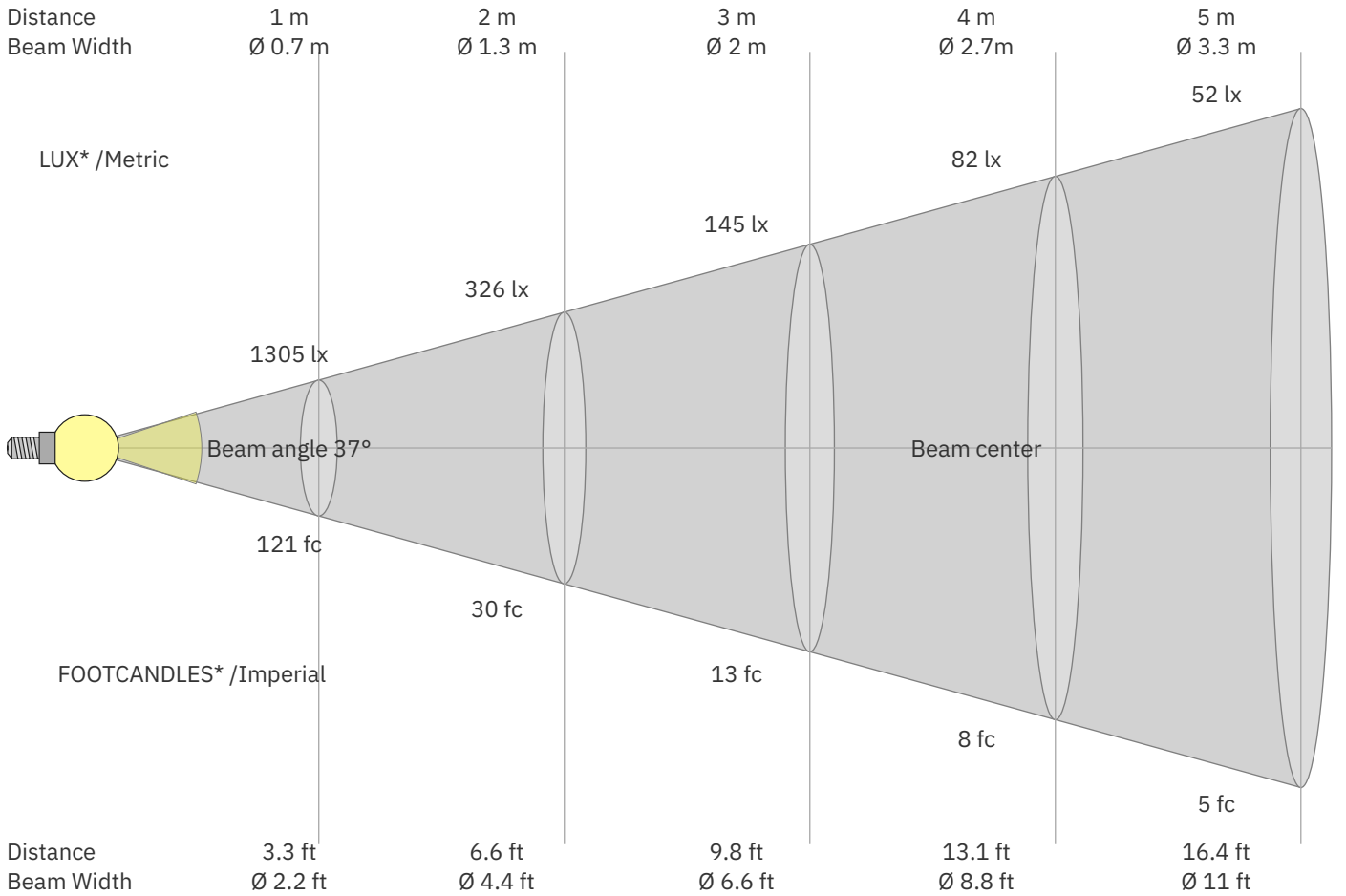


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Beam Details



\*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
1305	326	145	82	52	36	27	20	16	13	11	9	8	7	6	5	5	4	4	3	lux
121.2	30.3	13.5	7.6	4.8	3.4	2.5	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
1305	1291	1265	1233	1181	1110	1019	913	798	681	572	481	418	376	350	331	316	300	282	253	cd
100%	99%	97%	95%	91%	85%	78%	70%	61%	52%	44%	37%	32%	29%	27%	25%	24%	23%	22%	19%	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
1305	1291	1265	1233	1181	1110	1019	913	798	681	572	481	418	376	350	331	316	300	282	253	cd
100%	99%	97%	95%	91%	85%	78%	70%	61%	52%	44%	37%	32%	29%	27%	25%	24%	23%	22%	19%	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
1305	1291	1265	1233	1181	1110	1019	913	798	681	572	481	418	376	350	331	316	300	282	253	cd
100%	99%	97%	95%	91%	85%	78%	70%	61%	52%	44%	37%	32%	29%	27%	25%	24%	23%	22%	19%	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
1305	1291	1265	1233	1181	1110	1019	913	798	681	572	481	418	376	350	331	316	300	282	253	cd
100%	99%	97%	95%	91%	85%	78%	70%	61%	52%	44%	37%	32%	29%	27%	25%	24%	23%	22%	19%	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	25.1	25.8	25.3	26.0	26.2	25.1	25.8	25.3	26.0	26.2
	3H	24.9	25.7	25.3	25.9	26.1	24.9	25.7	25.3	25.9	26.1
	4H	24.9	25.7	25.3	25.9	26.2	24.9	25.7	25.3	25.9	26.2
	6H	25.1	25.7	25.4	26.0	26.4	25.1	25.7	25.4	26.0	26.4
	8H	25.1	25.8	25.5	26.1	26.5	25.1	25.8	25.5	26.1	26.5
	12H	25.2	25.8	25.5	26.1	26.5	25.2	25.8	25.5	26.1	26.5
4H	2H	24.8	25.6	25.2	25.8	26.0	24.8	25.6	25.2	25.8	26.0
	3H	24.8	25.4	25.2	25.8	26.2	24.8	25.4	25.2	25.8	26.2
	4H	24.8	25.4	25.3	25.8	26.3	24.8	25.4	25.3	25.8	26.3
	6H	25.0	25.6	25.5	25.9	26.3	25.0	25.6	25.5	25.9	26.3
	8H	25.1	25.7	25.7	26.0	26.4	25.1	25.7	25.7	26.0	26.4
	12H	25.3	25.7	25.8	26.1	26.5	25.3	25.7	25.8	26.1	26.5
8H	4H	24.8	25.3	25.3	25.7	26.0	24.8	25.3	25.3	25.7	26.0
	6H	25.1	25.5	25.6	26.0	26.5	25.1	25.5	25.6	26.0	26.5
	8H	25.4	25.7	25.9	26.2	26.8	25.4	25.7	25.9	26.2	26.8
	12H	25.6	25.8	26.2	26.3	26.9	25.6	25.8	26.2	26.3	26.9
12H	4H	24.8	25.2	25.3	25.6	26.1	24.8	25.2	25.3	25.6	26.1
	6H	25.2	25.5	25.7	26.0	26.6	25.2	25.5	25.7	26.0	26.6
	8H	25.4	25.7	26.0	26.2	26.8	25.4	25.7	26.0	26.2	26.8

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

S = 1.0H	2.1 / -2.9	2.1 / -2.9
S = 1.5H	4.2 / -3.3	4.2 / -3.3
S = 2.0H	6.1 / -3.6	6.1 / -3.6

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	0			
Floor reflectance	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	106	106	106	102	102	102	100	
1	113	110	108	105	111	108	106	104	104	102	100	100	99	97	97	96	95	93
2	107	102	98	95	105	101	97	94	97	94	92	94	92	90	92	90	88	86
3	102	95	90	86	100	94	89	85	91	87	84	89	85	83	87	84	81	80
4	97	89	83	79	95	88	83	78	86	81	78	84	80	77	82	78	76	74
5	92	83	77	73	90	82	77	73	81	76	72	79	75	71	77	74	71	69
6	87	78	72	68	86	77	72	68	76	71	67	74	70	67	73	69	66	65
7	83	74	68	63	82	73	67	63	72	67	63	70	66	62	69	65	62	61
8	79	69	63	59	78	69	63	59	68	63	59	67	62	59	66	62	58	57
9	75	66	60	56	74	65	60	56	64	59	56	63	59	55	63	58	55	54
10	72	62	57	53	71	62	56	53	61	56	52	60	56	52	60	55	52	51