



## PHOTOMETRIC LIGHT REPORT

# LED spot | 50mm | 700mA | 6.5W | white | 2700K

Article number: 148-193



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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 148-193. 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 148-193 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 148-193 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	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	6.8 W – PF 1.0 – DPF 0.44
Frequency of Input Power	0 Hz
Warm-up Time and Variation	Lamp stabilized in 19 min 21 sec --5.4%

### Tested light source

Manufacturer and Order Code	Tronix Lighting – 148-193
Product Description	LED spot   50mm   700mA   6.5W   white   2700K Batch: F22

### Main Light Measurement Results

Output – Total Lumen (Up% / Down%)	411 lm – 0% / 100%
Efficiency	60 lm/W
Energy efficiency class	G
Peak Intensity and Beam Angle	1187 cd – 31°
Correlated Colour Temperature	CCT = 2767 K
Colour Shift. CIE duv	Duv -0.0005
Colour Rendering Index	CRI 97.9
Colour Rendering TM30-18	R <sub>f</sub> 95.4 – R <sub>g</sub> 100.5
Television Lighting Consistency Index	TLCI = 97
Flicker	SVM n/a – PstLM n/a



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### Electrical measurement details

#### Input Power

RMS Input voltage feed. $V_{RMS}$	9.73 V
RMS Input current feed. $I_{RMS}$	0.700 A
Total input power	6.8 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: 23.0%



Lumen efficiency: 60 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	<b>Colour temperature change during warm-up</b>	CCT start	2785 K
Stable change max	2.0%		CCT shift	-18 K
Minimum warm-up time	15 min		CCT end	2767 K

#### Warm-up Results

Total warmup time	Lamp stabilized in 19 min 21 sec	<b>Output intensity change during warm-up</b>	Output start	433 lm
Warmup variation	-5.4%		Output change	-22 lm
			Output end	411 lm



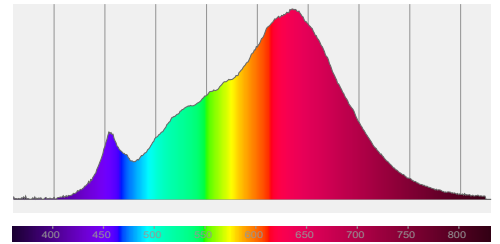
148-193 LED spot | 50mm | 700mA | 6.5W | white | 2700K

## Colour measurement details

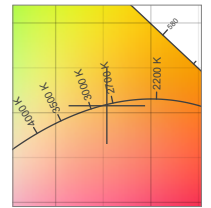
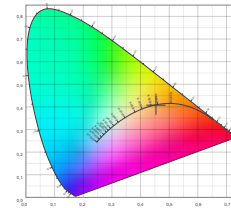
Total lumen output: 411 lm  
 Correlated Colour Temperature: 2767 K  
 Colour coordinates CIE 1931: (x;y) = (0.454;0.408)  
 Colour deviation from BBL: Duv = -0.0005

TM30-18 Colour Fidelity Index:  $R_f$  95.4  
 TM30-18 Colour Gamut Index:  $R_g$  100.5  
 Colour Rendering Index (Ra): CRI 97.9  
 Colour Rendering Index. (red component):  $R_9 = 85.9$

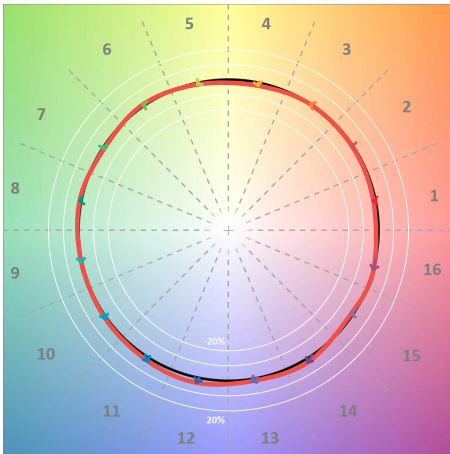
Colour Quality Scale: CQS = 95.2  
 Television Lighting Consistency Index: TLCI = 97



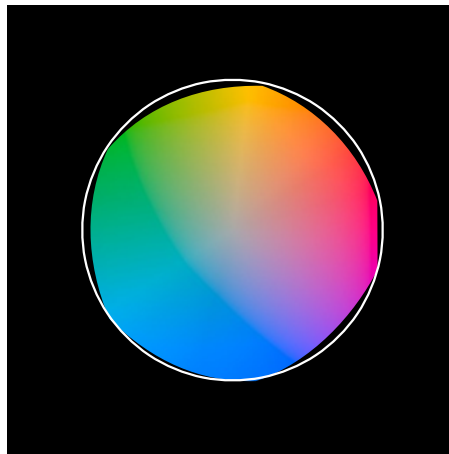
Relative spectral power distribution



## TM30 details

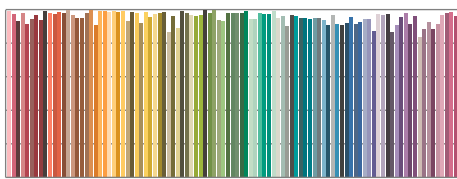


TM30 Colour vectors per hue bin

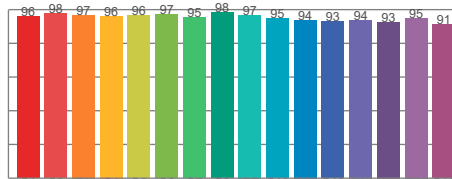


TM30 Colour distortion

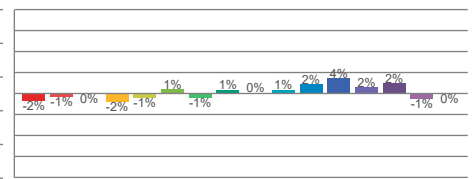
Hue Bin	$R_f$	Shifts (%)	
		Chroma	Hue
C1	96	-2%	0%
C2	98	-1%	0%
C3	97	0%	1%
C4	96	-2%	-1%
C5	96	-1%	1%
C6	97	1%	1%
C7	95	-1%	1%
C8	98	1%	0%
C9	97	0%	2%
C10	95	1%	3%
C11	94	2%	4%
C12	93	4%	-1%
C13	94	2%	-4%
C14	93	2%	-5%
C15	95	-1%	-1%
C16	91	0%	-7%



TM30-18  $R_f$ -values per reference colour

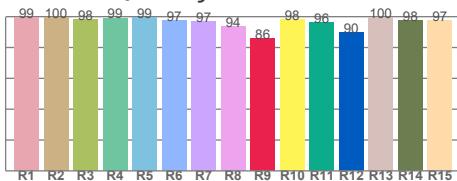


TM30-18  $R_f$ -values per hue bin

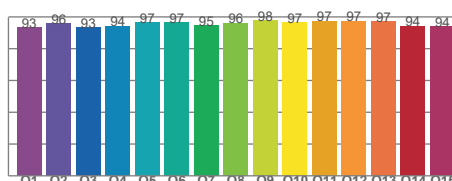


TM30 Chroma shift

## Colour Quality details



Colour Rendering Index



Colour Quality Scale

Document revision date: 1-7-2025 Measurement serial: VFR-250626-9878-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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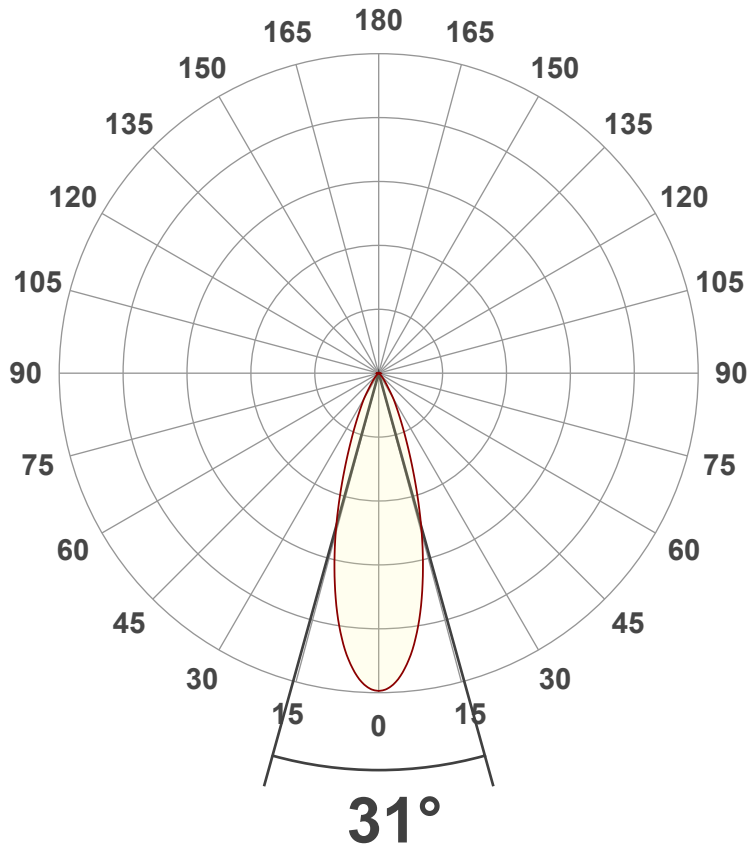


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Beam angle

**Luminous Intensity diagram**

Unit: 0-100% of peak intensity



**Main Values**

Output (total Lumen)	411 lm
Lumen Up/Down	0% / 100%
Peak Intensity	1187 cd
Beam Angle (50%)	31°
Beam Angle (90%)	31°
Beam Angle (10%)	31°

**Cut-off Angle**

Average 2.5%	77.3°
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**Field Angle**

Average 10%	58.6°
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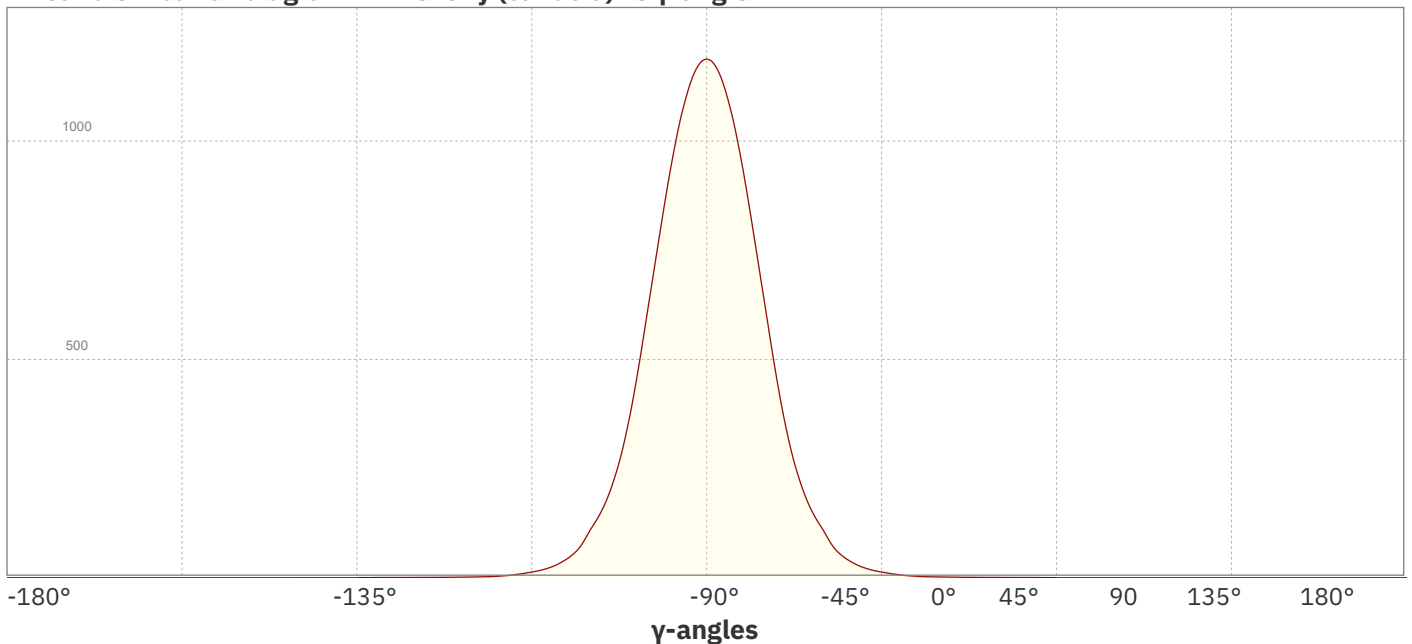
**Intensity Ratio**

In 120° cone	99.3%
In 90° cone	97.6%

**C planes**

- C000-C180
- C090-C270

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

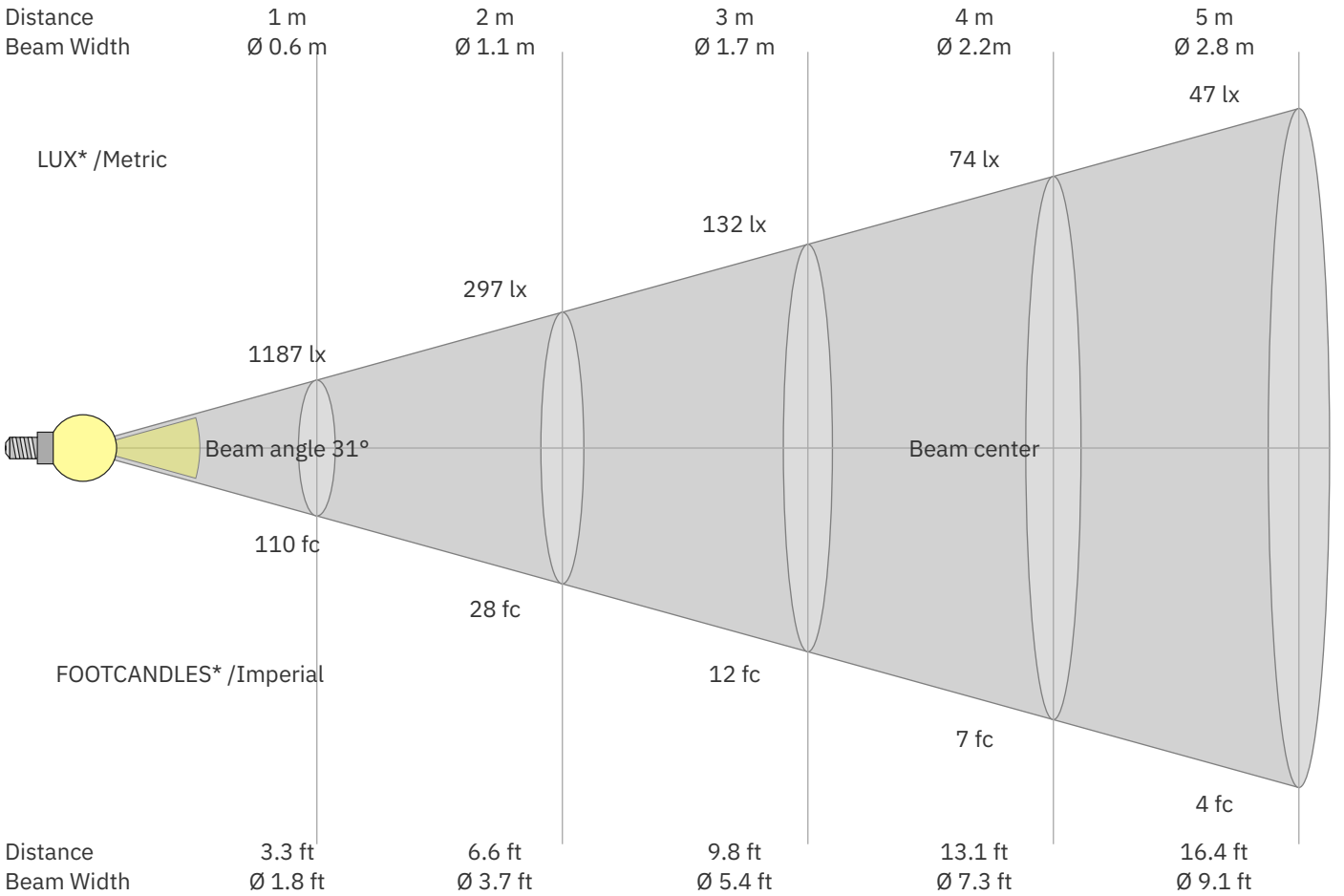


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Beam Details



\*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
1187	297	132	74	47	33	24	19	15	12	10	8	7	6	5	5	4	4	3	3	lux
110.3	27.6	12.3	6.9	4.4	3.1	2.3	1.7	1.4	1.1	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.3	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
1187	1175	1137	1077	997	900	791	679	566	457	361	282	221	173	137	109	78	57	43	33	cd
100%	99%	96%	91%	84%	76%	67%	57%	48%	38%	30%	24%	19%	15%	12%	9%	7%	5%	4%	3%	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
1187	1175	1137	1077	997	900	791	679	566	457	361	282	221	173	137	109	78	57	43	33	cd
100%	99%	96%	91%	84%	76%	67%	57%	48%	38%	30%	24%	19%	15%	12%	9%	7%	5%	4%	3%	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
1187	1175	1137	1077	997	900	791	679	566	457	361	282	221	173	137	109	78	57	43	33	cd
100%	99%	96%	91%	84%	76%	67%	57%	48%	38%	30%	24%	19%	15%	12%	9%	7%	5%	4%	3%	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
1187	1175	1137	1077	997	900	791	679	566	457	361	282	221	173	137	109	78	57	43	33	cd
100%	99%	96%	91%	84%	76%	67%	57%	48%	38%	30%	24%	19%	15%	12%	9%	7%	5%	4%	3%	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		15.3	15.8	15.4	16.0	16.2	15.3	15.8	15.4	16.0	16.2
3H		15.1	15.8	15.5	16.0	16.1	15.1	15.8	15.5	16.0	16.1
4H		15.1	15.7	15.5	16.0	16.2	15.1	15.7	15.5	16.0	16.2
6H		15.2	15.7	15.5	16.0	16.4	15.2	15.7	15.5	16.0	16.4
8H		15.2	15.7	15.6	16.1	16.4	15.2	15.7	15.6	16.1	16.4
12H		15.3	15.8	15.7	16.1	16.6	15.3	15.8	15.7	16.1	16.6
4H 2H		15.0	15.6	15.4	15.9	16.1	15.0	15.6	15.4	15.9	16.1
3H		15.0	15.5	15.4	15.9	16.3	15.0	15.5	15.4	15.9	16.3
4H		15.0	15.5	15.4	15.9	16.4	15.0	15.5	15.4	15.9	16.4
6H		15.1	15.6	15.6	15.9	16.3	15.1	15.6	15.6	15.9	16.3
8H		15.2	15.6	15.7	16.0	16.3	15.2	15.6	15.7	16.0	16.3
12H		15.3	15.7	15.8	16.1	16.5	15.3	15.7	15.8	16.1	16.5
8H 4H		14.9	15.4	15.5	15.7	16.1	14.9	15.4	15.5	15.7	16.1
6H		15.1	15.4	15.6	15.9	16.4	15.1	15.4	15.6	15.9	16.4
8H		15.4	15.6	15.9	16.1	16.7	15.4	15.6	15.9	16.1	16.7
12H		15.6	15.8	16.2	16.3	16.9	15.6	15.8	16.2	16.3	16.9
12H 4H		14.9	15.3	15.4	15.7	16.1	14.9	15.3	15.4	15.7	16.1
6H		15.2	15.4	15.7	15.9	16.5	15.2	15.4	15.7	15.9	16.5
8H		15.4	15.6	16.0	16.1	16.7	15.4	15.6	16.0	16.1	16.7

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

S = 1.0H	3.8 / -3.0	3.8 / -3.0
S = 1.5H	6.2 / -3.3	6.2 / -3.3
S = 2.0H	8.1 / -3.6	8.1 / -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 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	106	106	106	102	102	102	100	
1	114	112	110	108	112	110	108	106	106	104	103	102	101	100	99	98	97	95
2	110	106	102	99	108	104	101	98	101	98	98	96	94	95	94	92	91	
3	106	100	96	93	104	99	95	92	96	93	91	94	91	89	92	90	88	87
4	102	95	91	87	100	94	90	87	92	89	86	90	87	85	89	86	84	83
5	98	91	86	83	96	90	86	82	88	85	82	87	84	81	85	83	80	79
6	94	87	82	79	93	86	82	78	85	81	78	84	80	77	82	79	77	76
7	91	83	79	75	90	83	78	75	82	78	75	81	77	74	79	76	74	73
8	88	80	75	72	87	80	75	72	79	74	71	78	74	71	77	73	71	70
9	85	77	72	69	84	77	72	69	76	72	69	75	71	69	74	71	68	67
10	82	74	70	66	81	74	69	66	73	69	66	72	69	66	72	68	66	65