



LISUN GROUP



Rotation Luminaire Goniospectroradiometer

(LSG-1700BCCD/LSG-1800BCCD/ LSG-1800XCCD High Precision)

Brochure

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Leader in Lighting & Electrical Test Instruments

Rev. 10/18/2019

System Configuration

A. Goniophotometric System:

- Goniometric Rotating Console:
 - 1) LSG-1800XCCD/LSG-1800BCCD: Japanese Mitsubishi Motor and German Angle encoder System to keep the test accuracy to 0.1degree
 - 2) LSG-1700BCCD: Taiwan produced Motor and Angle encoder System to keep the test accuracy to 0.2degree
- LSG-1800XCCD/LSG-1800BCCD has Goniometric Rotating Control Instrument in 19inch cabinet: It connects to the PC and was controlled by the software.
- LSG-1800XCCD/LSG-1800BCCD has Goniometric Rotating Control Instrument in dark room: This can allow the customer to control the rotating in the dark room when install the luminaires but no need to control in the PC.
- Double Channel & High Precision Photometer
- Class A Constant Temperature Photo Detector (Option is Class L)
- Cross-beam Laser System for Calibrating
- English Measuring Software
- Two sets of luminaires Clamps: multi-functions
- Oversea Delivery and Packing: all of the instruments and accessories will be packed with Fumigation free three plywood, include the delivery cost to Shanghai sea port

B. SLS-100W DC Standard Light Intensity Lamp

C. Digital Power Meter:

- 1) LSG-1800XCCD/LSG-1800BCCD has LS2010 Digital Power Meter: High Accuracy to measure AC voltage, current, power and PF, also measure harmonic.
- 2) LSG-1700BCCD has LS2012 Digital Power Meter: Accuracy to measure AC and DC voltage, current, power and PF

D. DC3010 CC & CV DC Power Source: DC3010 output is 30V/10A, Option can be DC6010 (output is 60V/10A) and DC12010 (output is 120V/10A)

E. AC Power Source:

- 1) LSG-1800XCCD/LSG-1800BCCD has LSP-1KVAS AC Power Source
- 2) LSG-1700BCCD has LSP-500VAS AC Power Source

F. CASE-19IN 19inch Standard Instruments Cabinet

G. LMS-9000B High Precision CCD Spectraidomeeter

H. CLAMP-9000 Accessories and Adjustable Tripod for LMS-9000B

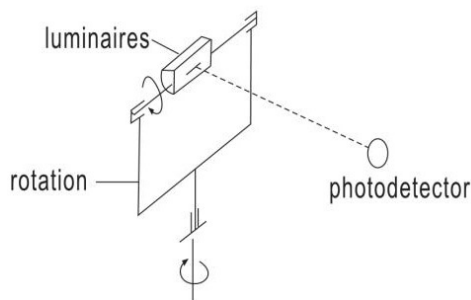
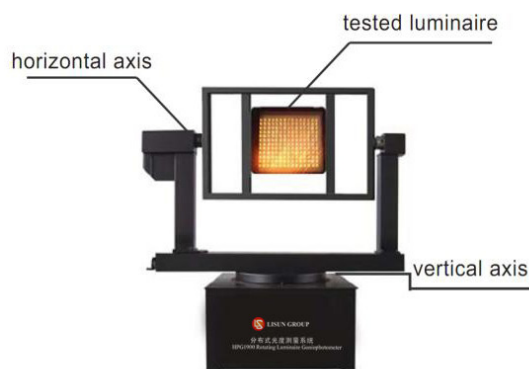
Note: PC and Printer prepared by the customer (request at least two USB ports)

2. Working Principle

Goniophotometric System carries out measuring methods of fixed location and rotating luminaires. The measured luminaire is installed on the rotating supporter, the center of which is in line with the rotating supporter center with the help of Laser sight. The fixed photometry detector is testing the luminous intensity in various horizontal directions, while the light source rotating. The mechanical equipment allows turning the tested luminaires around a vertical axis and a horizontal axis. When tested luminaires turn around horizontal axis, the detector which is at the same level with rotating table will measure the intensity of each direction at this surface. When rotating with vertical axis, the detector will measure the intensity at the vertical surface. The vertical and horizontal axis can be rotated continuously at $-180^{\circ} \sim +180^{\circ}$. According to the measurement requirements, the system can be operated in B- β , A- α and C- γ coordinates. When getting intensity distribution data, computer will calculate other photometric parameters automatically.

Double pillars structure (B- β coordinate system)

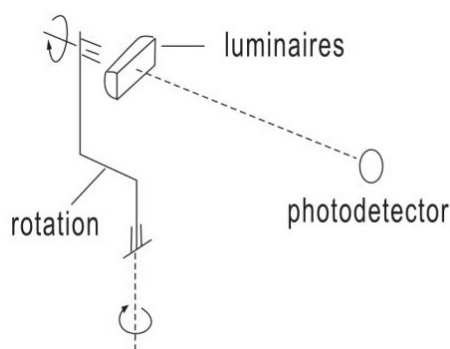
This type is applied to fixed grille lamp. The symmetry axis of lamp and the horizontal of rotating supporter is coaxial, in the B- β coordinate system, and the two is vertical Cross, in the A- α coordinate system.



Double pillars structure

Single pillar structure (C- γ coordinate and Conic coordinate)

The single column structure will be gotten when the assistant column is taken down from double columns structure. This type is applied to fixed tube lamp, spot lamp etc. The axis radiation of lamp and the horizontal of rotating supporter is coaxial.



3. System Functions

LSG-1800BCCD/LSG-1700BCCD Goniospectroradiometer is high precision automatic goniophotometric instrument for luminous intensity distribution measurements with facility for turning the light source. The LSG series can do the spatial CCT test when do the intensity distribution test. It is for industrial laboratory measurements the photometric data of luminaires.

Constant Temperature Photo Detector

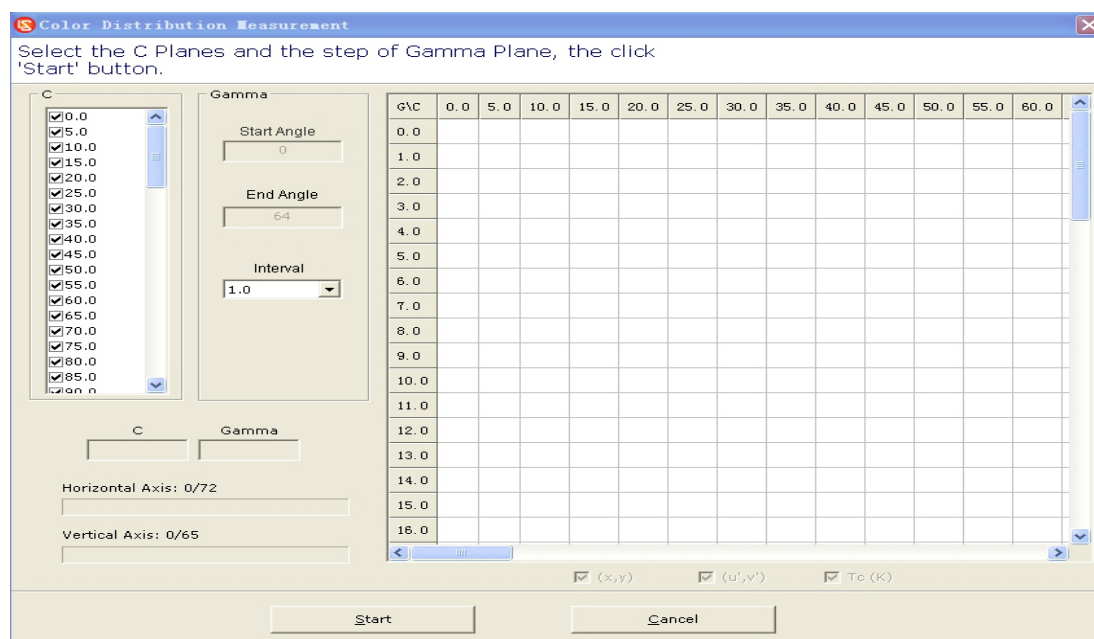


Be utilized to measure photometric parameters of luminaires for LED road lighting fixture, room lighting fixture and projecting lighting fixture, such as spatial intensity distribution curve, spatial iso-intensity curve, intensity distribution curve on each section (represent by right-angled coordinates or polar coordinates, luminance limitation curve, luminaire efficiency, glare grade, effective beam angle, upward luminous flux ratio, downward luminous flux ratio, total luminous flux, effective luminous flux, utilization factor and electric parameters voltage, current, wattage, power factor and etc. The measured data meets IES standard format and can be applied for lighting design by lighting design software. The measurement system fully satisfies the requirement of lighting design work.



4. Specifications

- Meets the requirements of CIE, IEC, IES LM-79 & GB standards
- The Goniospectroradiometer system=Goniophotometer+Spectroradiometer Integrating Sphere system
- The tested luminaries rotates around an angle of $(\gamma)\pm 180^\circ$ (or 0-360°) and the tested luminaries rotates around itself with an angle of $(C)\pm 180^\circ$ (or 0-360°)
- Luminosity Testing Range: Illuminance 0.001lx~99,999lx; Light Intensity 1.0cd~10⁷cd(detector)
- The accuracy of angle: 0.1°(LSG-1800XCCD/LSG-1800BCCD) and 0.2°(LSG-1700BCCD)
- Work with high accuracy and quick CCD Spectroradiometer to measure spatial color parameters.
- Accuracy of chromaticity coordinate: ± 0.0015 or ± 0.0005 (under standard A lamp)
- Spectral Range Wavelength: 380nm ~780nm; Accuracy of wavelength: $\pm 0.5\text{nm}$
- Accuracy of photometry: CIE Class A (Class L is for option)
- Testing Accuracy: 2%(Under Standard Lamp); Stray Light: less than 0.1%
- English Version software can run in Win7, Win8 or Win10.



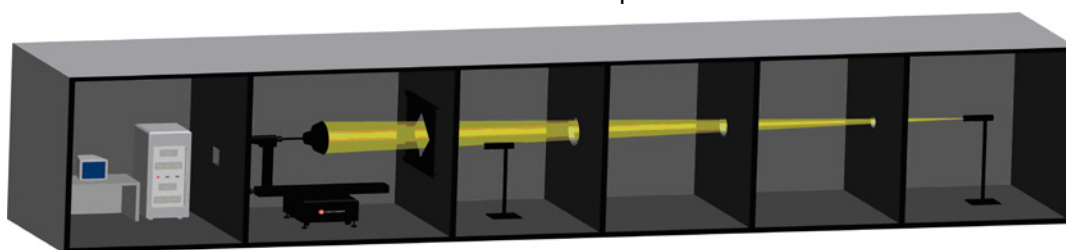
Model Number	The max size for the Testing Lamp(Unit: mm)		Max Weight
	C-Gamma Test with one Pillar	B-Beta Test with two Pillars	
LSG-1800XCCD	∅2500×550(Diameter*Depth)	700*600(Length*Width)	60kg
LSG-1800BCCD	∅1600×550(Diameter*Depth)	700*600(Length*Width)	50kg
LSG-1700BCCD	∅1600×550(Diameter*Depth)	700*600(Length*Width)	40kg

5.Laboratory Requirements

■ Room Requirements according to CIE

Model	Dark Room (W*H*L)	Operation Room(W*L)
LSG-1800XCCD	4*4*15~30m	3*3m
LSG-1800BCCD	4*2.5*8~30m	3*3m
LSG-1700BCCD	3*2.5*8~30m	3*3m

- The wall, ceiling and floor should be all coated with dull black paint or be covered by black cloth and black carpet.
- Air-conditioner should be set in the dark room to control the temperature around lamps to the standard value upon the CIE requirements
- LISUN engineer dept will submit the Lab Design support documents according to the customer's lab size after the formal purchase order was confirmed



6.Typical oversea market customers:

There are many world famous companies and lab institute choose Lisun Goniophotometer, Please get the reference customers' information from Lisun Group Oversea Sales Dept.

7.Design Standard of Device

The construction, technical parameter, test & operate steps as well as data processing software of Goniospectroradiometer meet the following requirements:

- 3.1 CIE Pub. NO.70,"The Measurement of Absolute Luminous Intensity Distributions"
- 3.2 CIE DIV. II-TC10,"Photometry of Luminaires"
- 3.3 IES LM-35-1989,"IES Approved Method for Photometric Testing of Floodlights"
- 3.4 IES LM-31,"IES Approved Method for Photometric Testing of Roadway Luminaires"
- 3.5 IES-LM-79, "Electrical and Photometric Measurements of Solid-State Lighting"
- 3.6 GB/T 7002-1986,"Luminosity Test of Flood Luminaires"
- 3.7 GB/T 9467-1988, "Luminosity Test of Indoor Luminaires"
- 3.8 GB/T 9468-1988, "Luminosity Test of Street Luminaires"
- 3.9 IES 61341 "Method of Measurement of Center Beam Intensity and Beam Angle(s) of Reflector Lamp"
- 3.10 IE Pub.NO.76, "Photometry-the CIE System of Physical Photometry"

8. Application Software

All control of the Goniospectroradiometer operations can be realized by the software, including gonophotometer movement, data acquisition and processing, real-time display on screen, report print and etc, thus enabling the measurement easy and secure.

This system can export data files as following formats:

IESNA Files (*.ies)
EULUMDAT Files (*.ldt)
CIEBSE TM14 Files (*.cib)
CIEBSE TM14 Files (*.tm4)
CIE Files (*.cie)
DIN CEN Files (*.cen)
Excel File (*.csv)

This kind of format files can be transferred by other illumination and luminaire design software such as DiaLux

Application software can also implement essential calculation for lighting design as iso-illuminance distribution curve on a working plane, luminance limitation curve, luminaire efficiency, effective beam angle, upward luminous flux ratio, downward luminous flux ratio, effective luminous flux, utilization factor curve etc.

The Next Page is Goniospectroradiometer Test Report

Report No.: LS1711

Test Time: 8/28/2017 17:02

Luminaire Property

Luminaire Manufacturer: LISUN
 Luminaire Category: LED Philips 112
 Lamp Catalog: LUMINUS
 Number of Lamps: 1
 Luminous Length (mm): 50
 Luminous Height (mm): 100
 Current: 0.530 A
 Power Factor: 0.999

Luminaire Description: LS-71-83-8077
 Lamp Description: LUMINUS001
 Lumens per Lamp: 550
 Luminous Width (mm): 50
 Voltage: 119.9 V
 Power: 63.55 W

Photometric Results

CIE Class: Direct
 Measurement Flux: 539.5 lm
 Downward Ratio: 98.08%
 Horizontal Diffuse Angle(50%): H99.2
 Vertical Diffuse Angle(50%): V101.5
 Luminaire Efficacy Rating (LER): 8.54
 Max. Intensity: 429.28 cd/klm
 S/MH(C0/C180): 1.14

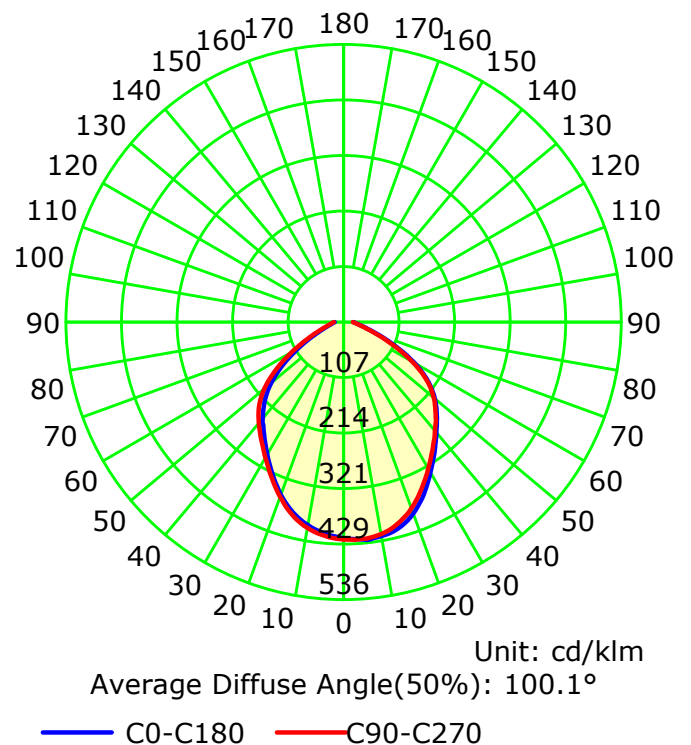
Total Rated Lamp Lumens: 550.0 lm
 Efficiency: 98.08%
 Upward Ratio: 0.00%

Central Intensity: 417.76 cd/klm
 Pos of Max. Intensity: H45 V8
 S/MH(C90/C270): 1.13

Picture Of Luminaire



Luminous Intensity Distribution Curve

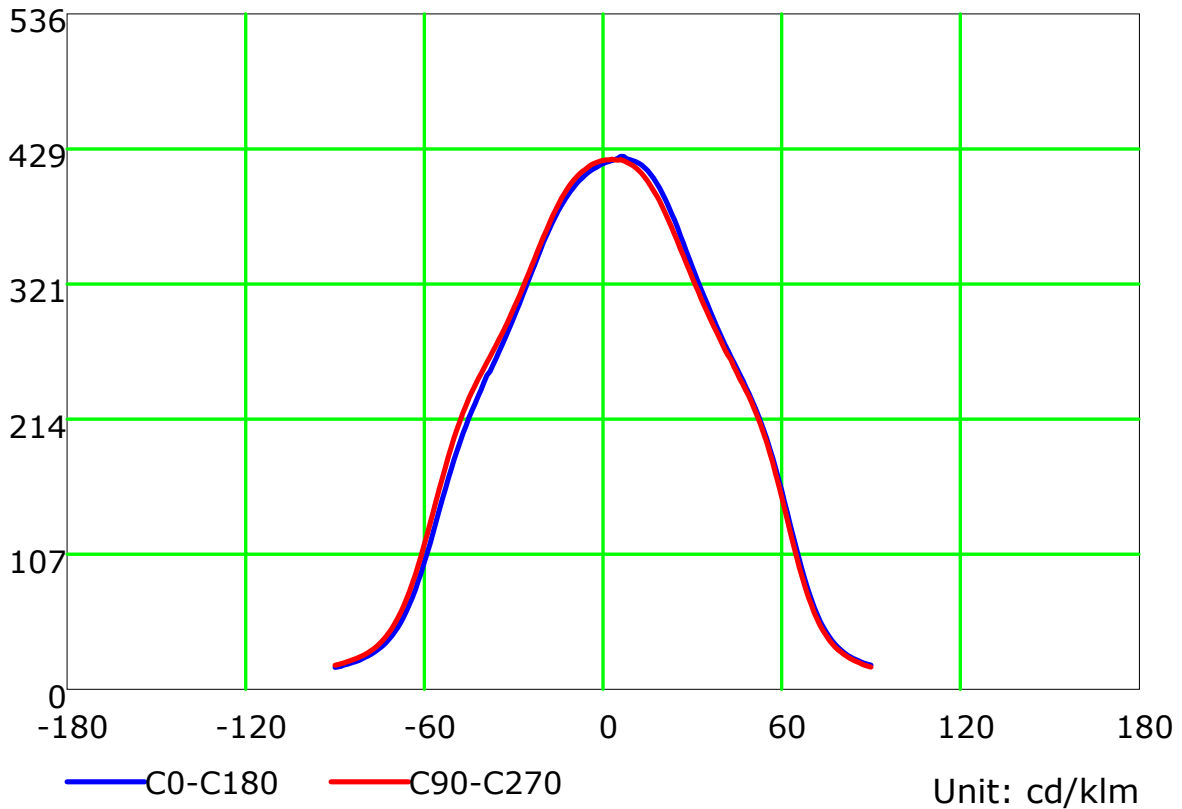
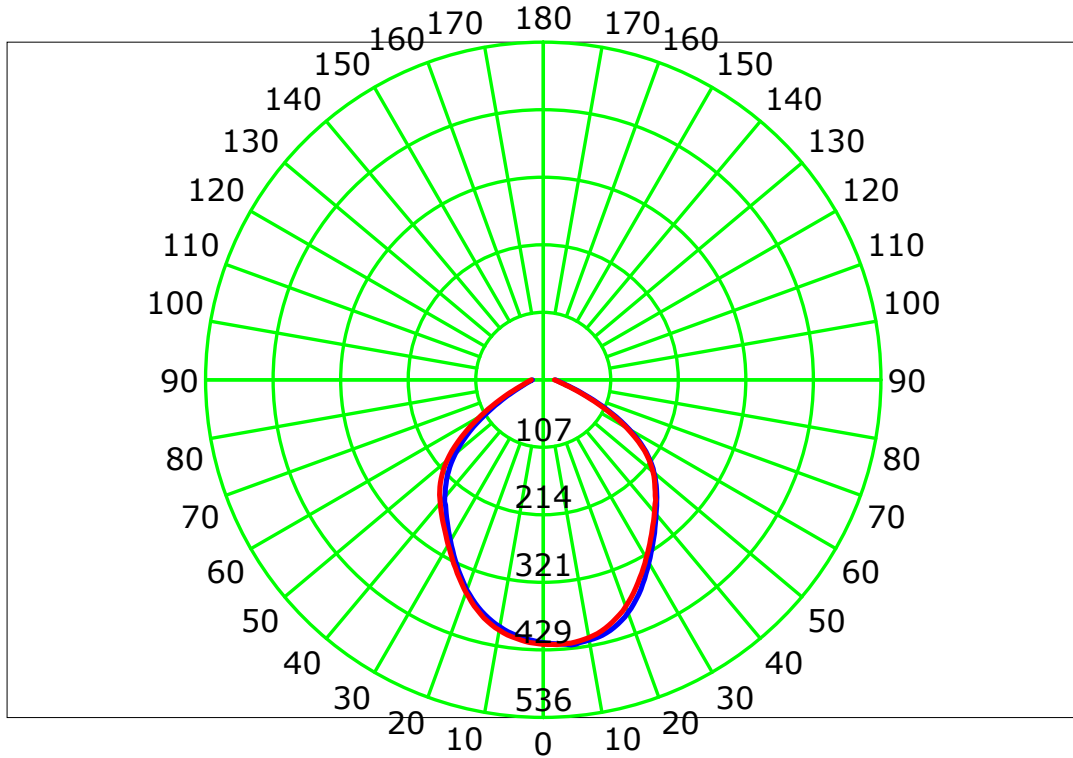


C Plane (°):0.0-360.0: 45.0
 Test Lab: LISUN
 Test Type: TYPE C
 Temperature: 24.5°
 Operator: Jacky

Gamma Plane (°):0.0-90.0:1.0
 Test Device: LSG-1800BCCD
 Distance: 8.000 m
 Humidity: 60%
 Inspector:



Luminous Intensity Distribution Curve

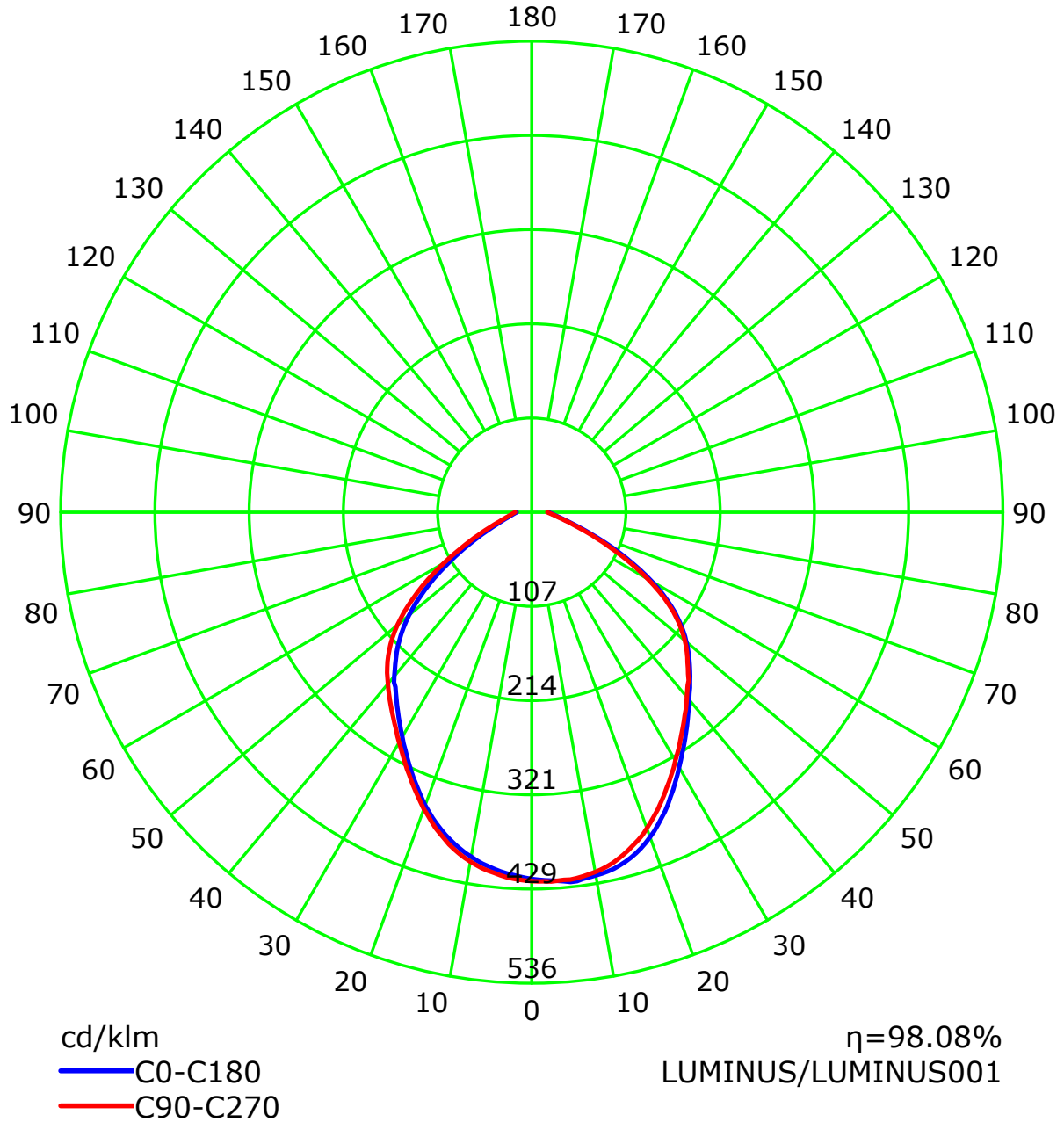


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Inspector:



Luminous Intensity Distribution Curve(cd/klm)



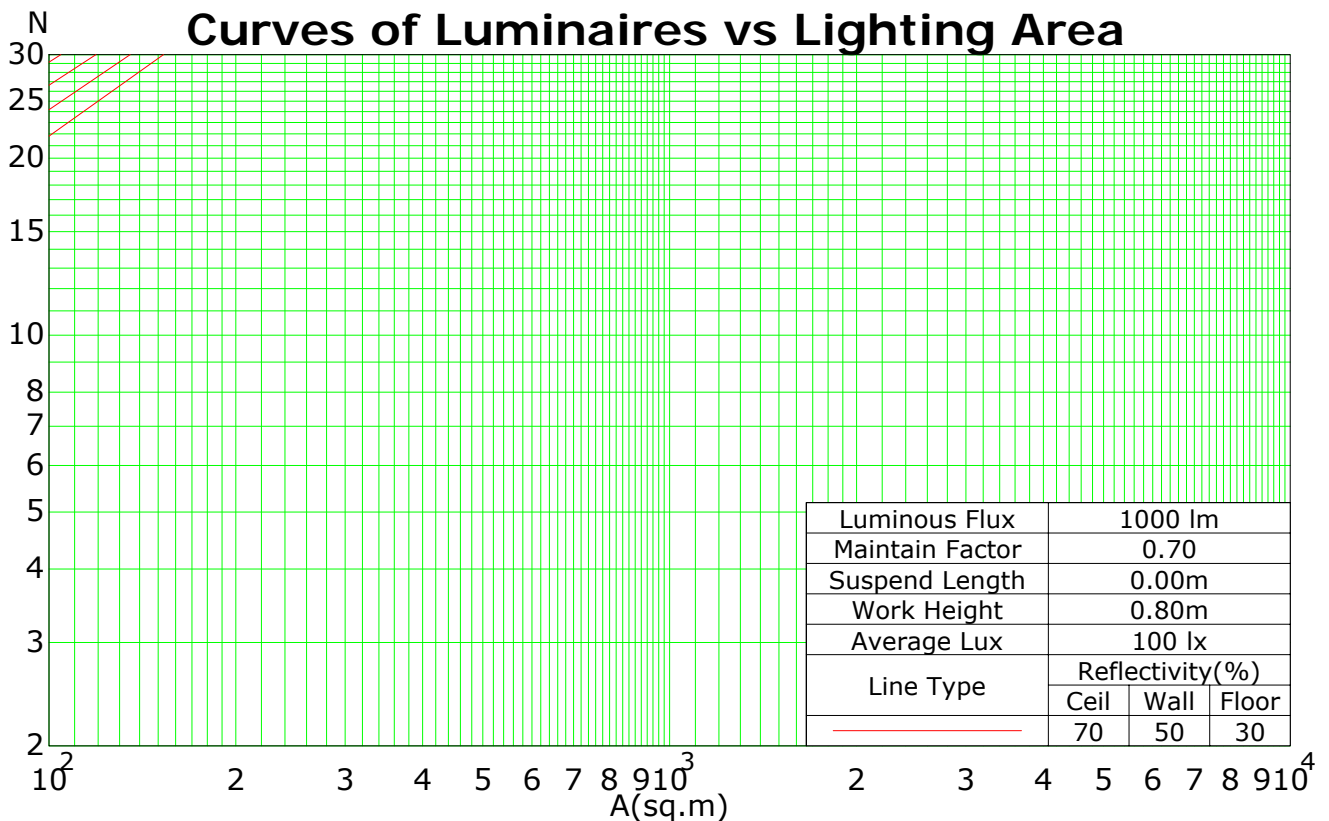
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Coefficients Of Utilization - Zonal Cavity Method

RC	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.5	0.5	0.5	0.3	0.3	0.3	0.1	0.1	0.1	0
RW	0.7	0.5	0.3	0.1	0.7	0.5	0.3	0.1	0.5	0.3	0.1	0.5	0.3	0.1	0.5	0.3	0.1	0
RCR	RF = 0.2																	
0	117	117	117	117	114	114	114	114	109	109	109	104	104	104	100	100	100	98
1	107	103	99	95	105	101	97	94	96	93	91	93	90	88	89	87	85	83
2	98	91	84	79	96	89	83	78	85	80	76	82	78	74	79	76	73	71
3	90	80	73	67	88	79	72	66	76	70	65	73	68	64	71	66	63	61
4	83	72	63	57	81	70	63	57	68	61	56	66	60	55	64	59	55	52
5	76	64	56	50	74	63	55	49	61	54	49	59	53	48	58	52	48	46
6	71	58	50	44	69	57	49	44	56	48	43	54	48	43	52	47	42	40
7	66	53	45	39	64	52	44	39	51	44	38	49	43	38	48	42	38	36
8	61	49	40	35	60	48	40	35	47	40	35	45	39	34	44	38	34	32
9	57	45	37	32	56	44	37	31	43	36	31	42	36	31	41	35	31	29
10	54	41	34	29	53	41	34	29	40	33	29	39	33	28	38	32	28	27

Spacing Criteria (0-180): 1.14
 Spacing Criteria (90-270): 1.13
 Spacing Criteria (Diagonal): 1.27

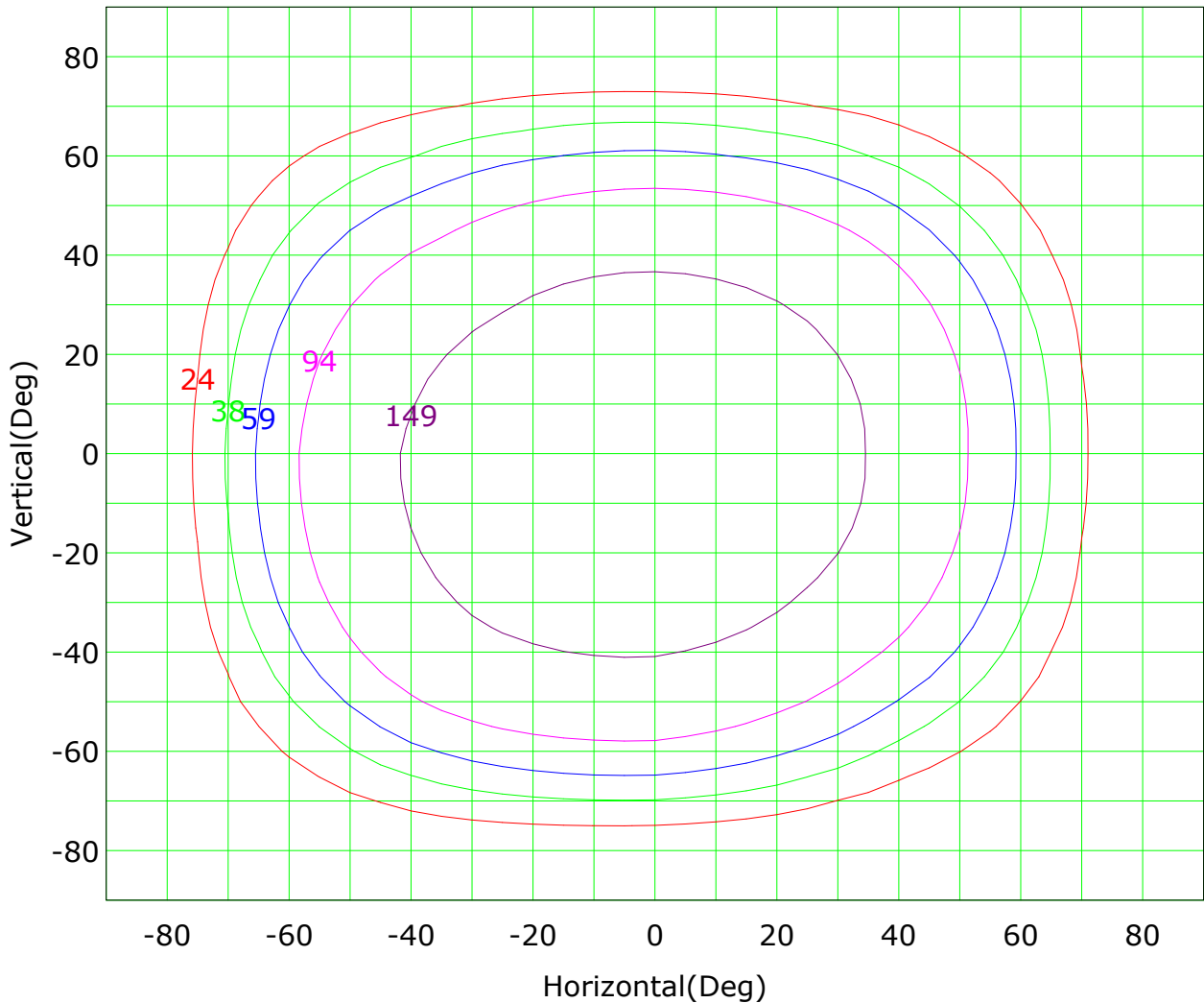


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 Humidity: 60%
 Inspector:



Isocandela (rectangle)



Imax (100%): 236 cd

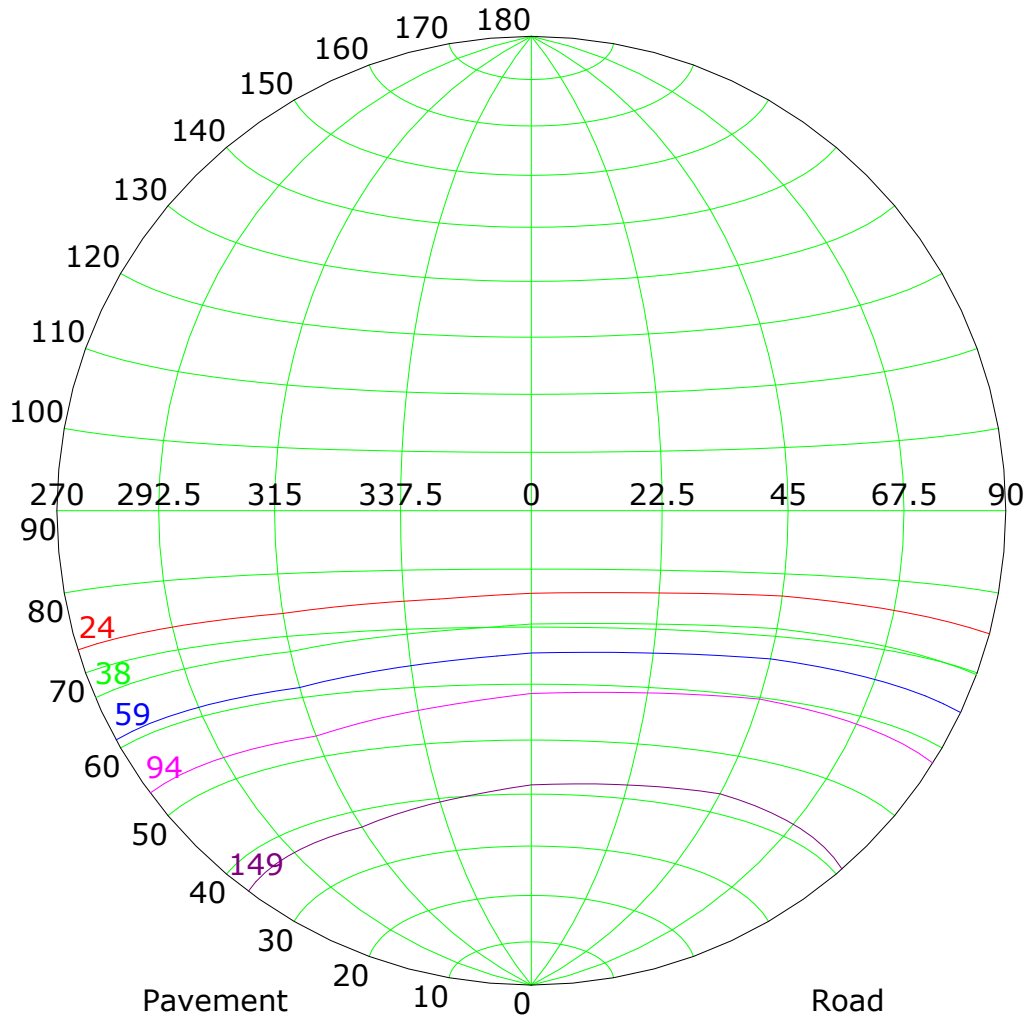
- (10%): 24 cd
- (16%): 38 cd
- (25%): 59 cd
- (40%): 94 cd
- (63%): 149 cd
- (100%): 236 cd

C Plane (°):0.0-360.0: 45.0
 Test Lab: LISUN
 Test Type: TYPE C
 Temperature: 24.5°
 Operator: Jacky

Gamma Plane (°):0.0-90.0:1.0
 Test Device: LSG-1800BCCD
 Distance: 8.000 m
 Humidity: 60%
 Inspector:



Isocandela (sphere)



Imax (100%): 236 cd

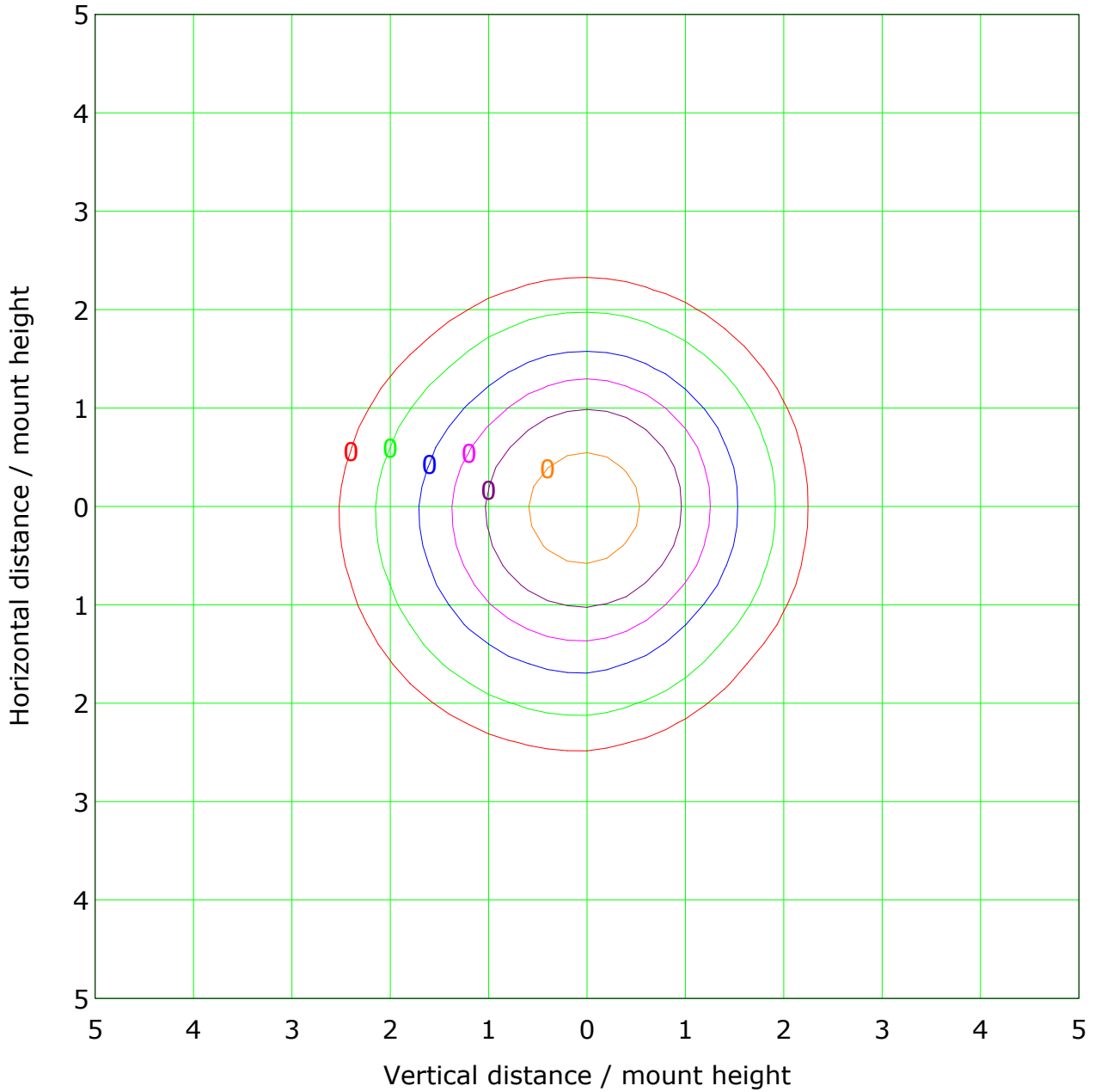
- (10%): 24 cd
- (16%): 38 cd
- (25%): 59 cd
- (40%): 94 cd
- (63%): 149 cd
- (100%): 236 cd

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Gamma Plane (°):0.0-90.0:1.0
 Test Device: LSG-1800BCCD
 Distance: 8.000 m
 Humidity: 60%
 Inspector:



IsoPPFD Plot



Mounting Height: 10.0m Max PPFD(100%): 0.048 $\mu\text{mol/s/m}^2$

— (1%): 0.000 $\mu\text{mol/s/m}^2$	— (2%): 0.001 $\mu\text{mol/s/m}^2$
— (5%): 0.002 $\mu\text{mol/s/m}^2$	— (10%): 0.005 $\mu\text{mol/s/m}^2$
— (20%): 0.010 $\mu\text{mol/s/m}^2$	— (50%): 0.024 $\mu\text{mol/s/m}^2$
— (100%): 0.048 $\mu\text{mol/s/m}^2$	

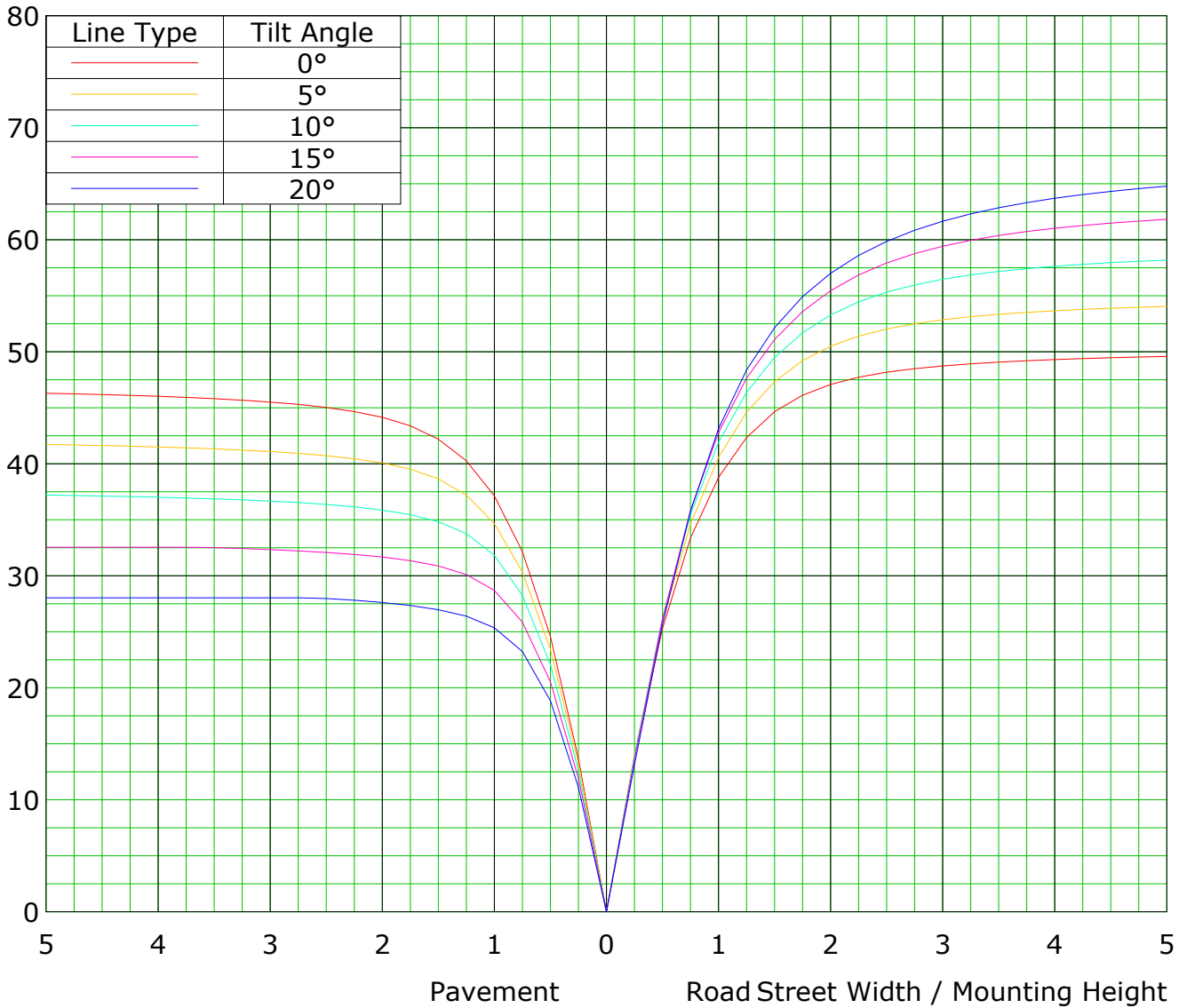
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Gamma Plane (°):0.0-90.0:1.0
 Test Device: LSG-1800BCCD
 Distance: 8.000 m
 Humidity: 60%
 Inspector:



Roadway CU Curve

Efficiency(%)



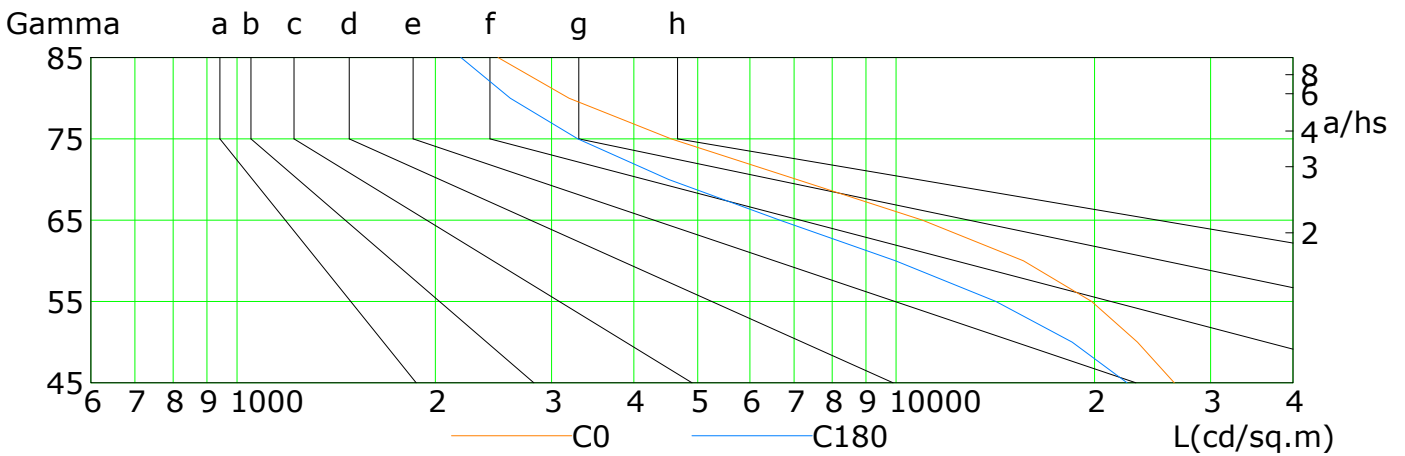
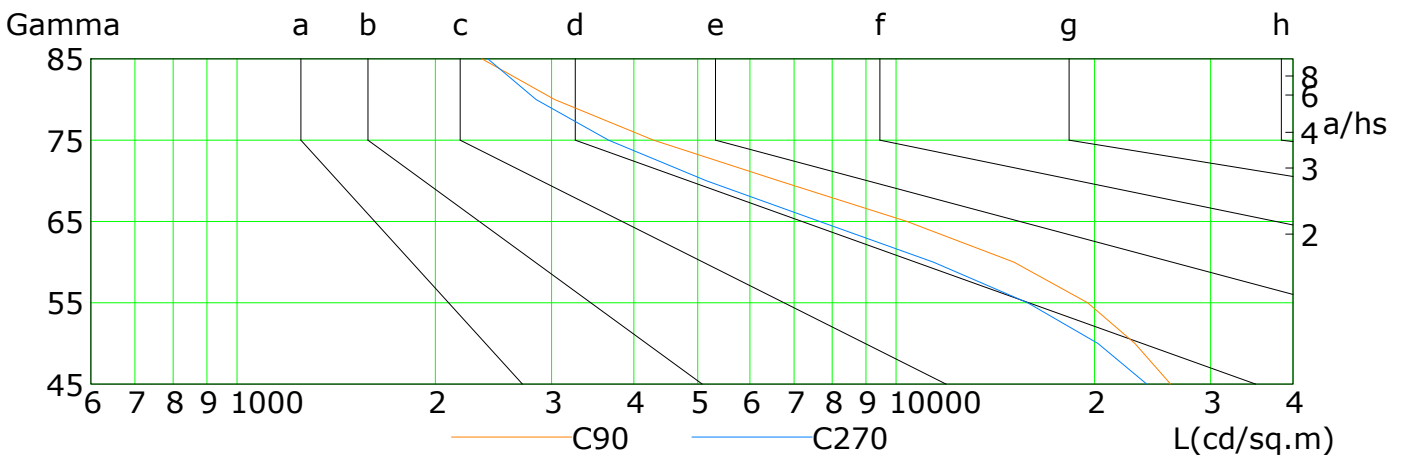
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Gamma Plane (°):0.0-90.0:1.0
Test Device: LSG-1800BCCD
Distance: 8.000 m
Humidity: 60%
Inspector:

Lum Limit Curve

Dazzle	Quality	Illuminance (lx)							
		2000	1000	500	<=300				
1.15	A								
1.50	B								
1.85	C								
2.20	D								
2.55	E								

a b c d e f g h



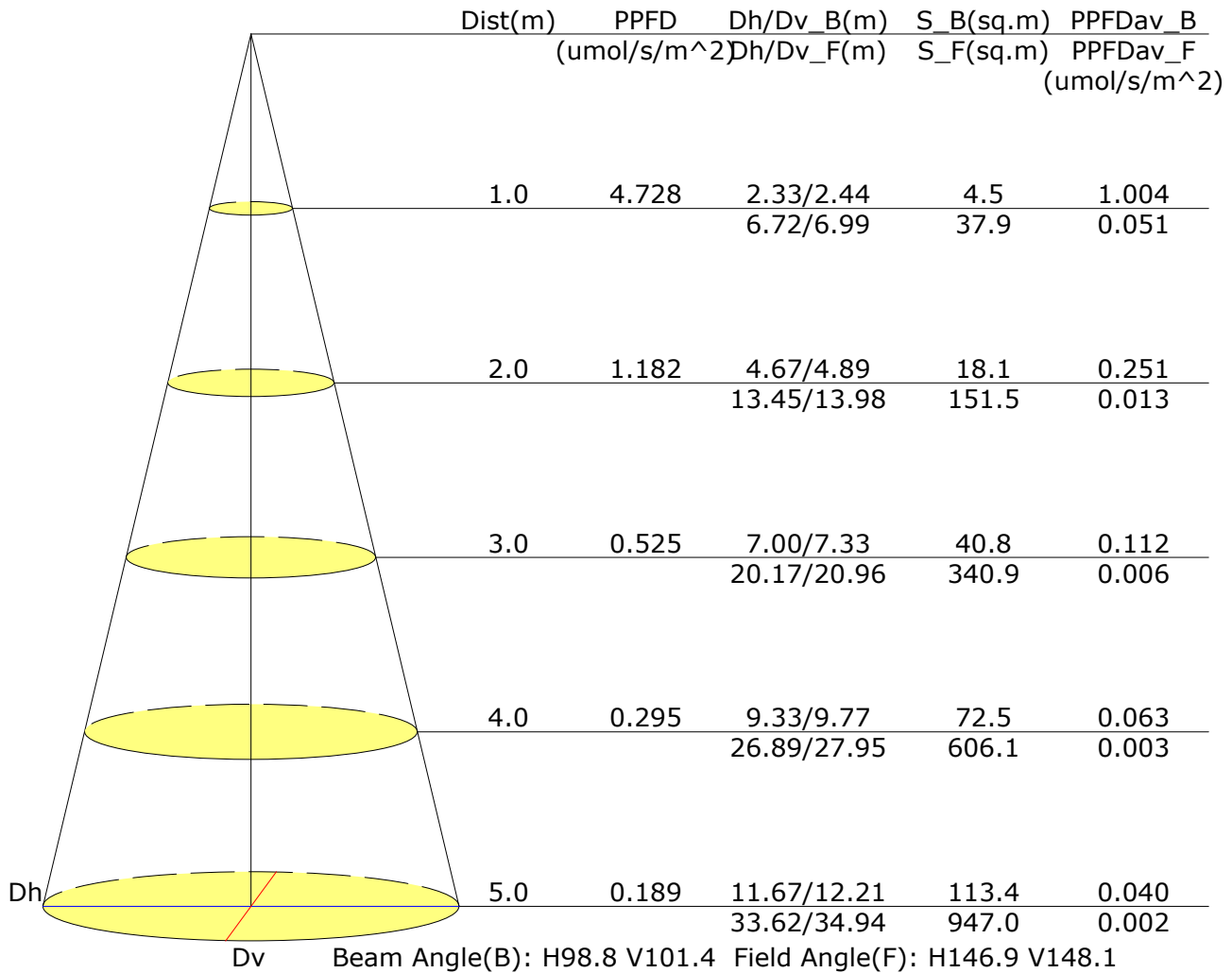
L(cd/sq.m)	G45	G50	G55	G60	G65	G70	G75	G80	G85
C0	26425	23238	19800	15600	10964	7073	4558	3190	2489
C90	26091	23021	19522	15087	10385	6637	4285	3033	2352
C180	22409	18493	14174	9978	6661	4520	3288	2598	2187
C270	24002	20235	15829	11389	7657	5155	3661	2842	2402

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 Operator: Jacky

Gamma Plane (°): 0.0-90.0: 1.0
 Test Device: LSG-1800BCCD
 Distance: 8.000 m
 Humidity: 60%
 Inspector:

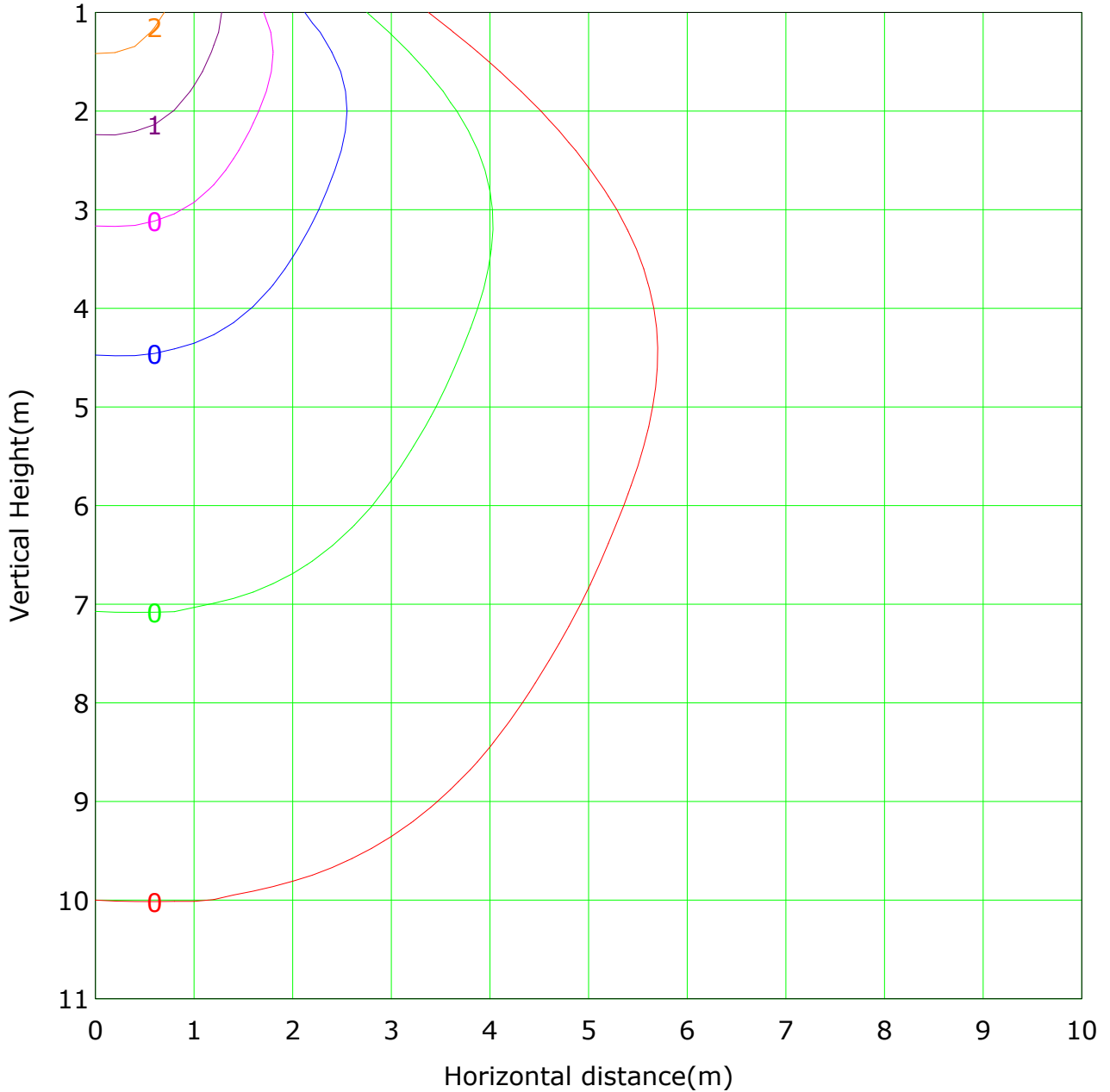


PPFD at a Distance





Vertical IsoPPFD Plot



Lowest(m): 1.0m Highest(m): 11.000m Max PPFD: 4.7 $\mu\text{mol/s/m}^2$
 — (1%): 0.047 $\mu\text{mol/s/m}^2$ — (2%): 0.095 $\mu\text{mol/s/m}^2$
 — (5%): 0.236 $\mu\text{mol/s/m}^2$ — (10%): 0.473 $\mu\text{mol/s/m}^2$
 — (20%): 0.946 $\mu\text{mol/s/m}^2$ — (50%): 2.364 $\mu\text{mol/s/m}^2$
 — (100%): 4.728 $\mu\text{mol/s/m}^2$

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Area Flux Table

Unit: lm/klm

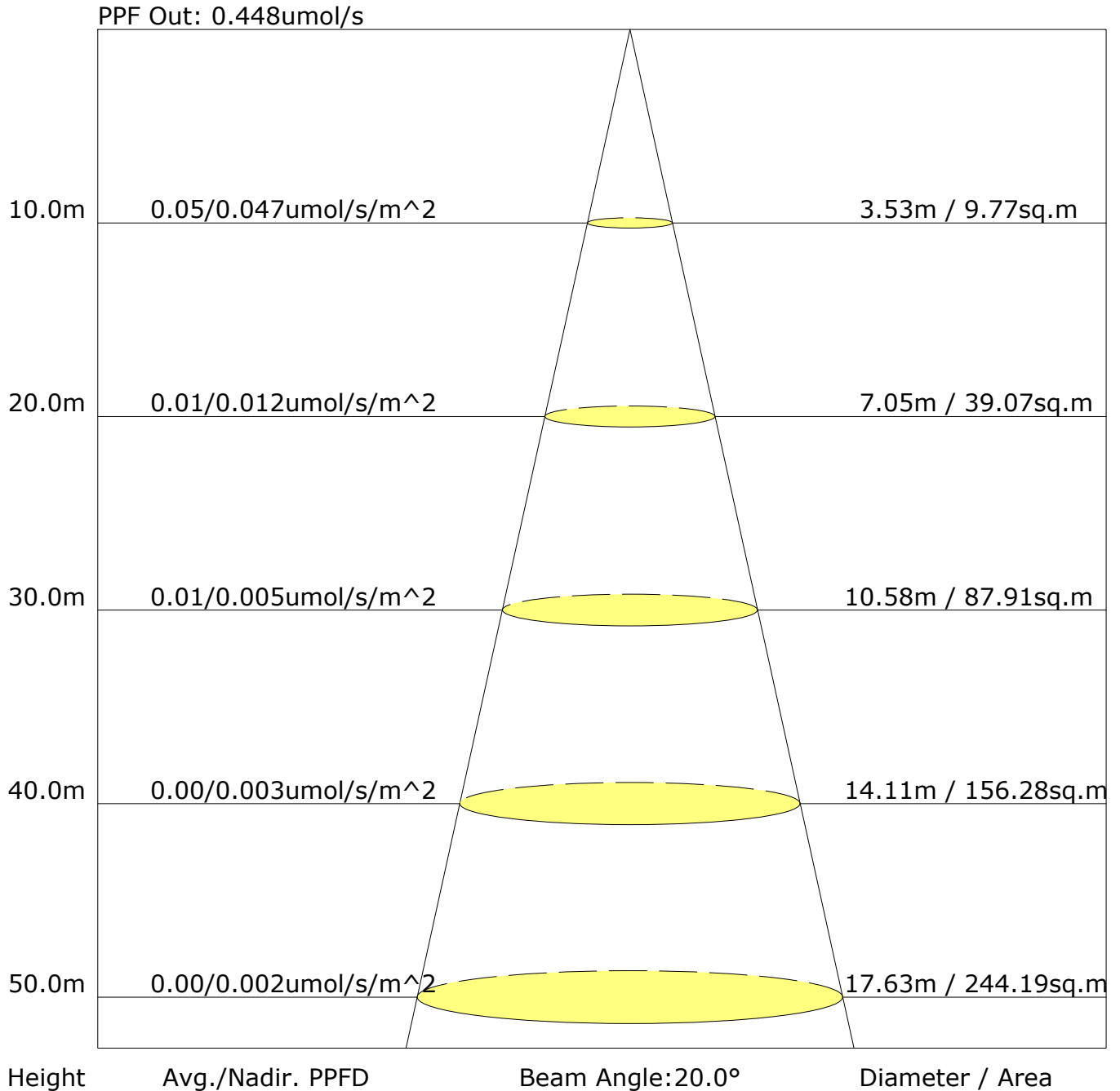
		Vertical plane																				
		-90	-80	-70	-60	-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80	90	Flux(E)	Flux(T)
Horizontal plane	-90	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.0	1.0
	-80	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.1	1.0	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.1	3.8
	-70	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.7	0.6	6.3	9.9
	-60	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	20.4	23.5
	-50	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	41.1	44.1
	-40	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	63.3	66.3
	-30	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	85.2	88.0
	-20	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	104.4	107.2
	-10	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	117.0	119.7
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	117.0	119.7
	10	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	111.7	114.3
	20	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	94.6	97.3
	30	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	73.3	76.0
	40	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	51.6	54.2
	50	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	30.0	32.6
	60	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	11.7	14.4
	70	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	1.7	4.9
	80	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	0.0	1.1
90	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.1	0.9	0.9	0.8	0.8	0.7	0.6	0.6	981	981	
																					932	932

C Plane (°):0.0-360.0: 45.0
 Test Lab: LISUN
 Test Type: TYPE C
 Temperature: 24.5°
 Operator: Jacky

Gamma Plane (°):0.0-90.0:1.0
 Test Device: LSG-1800BCCD
 Distance: 8.000 m
 Humidity: 60%
 Inspector:



The Average PPFD Effective Figure



C Plane (°):0.0-360.0: 45.0
Test Lab: LISUN
Test Type: TYPE C
Temperature: 24.5°
Operator: Jacky

Gamma Plane (°):0.0-90.0:1.0
Test Device: LSG-1800BCCD
Distance: 8.000 m
Humidity: 60%
Inspector:

UGR Table

Reflectance:										
Ceiling (cavity)	0.7	0.7	0.5	0.5	0.3	0.7	0.7	0.5	0.5	0.3
Wall	0.5	0.3	0.5	0.3	0.3	0.5	0.3	0.5	0.3	0.3
Reference plane	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Room dimensions	Viewed crosswise					Viewed endwise				
X=2H Y=2H	22.5	23.8	22.8	24.1	24.3	22.1	23.4	22.4	23.6	23.9
3H	23.1	24.3	23.4	24.6	24.9	22.6	23.8	22.9	24.1	24.3
4H	23.3	24.4	23.6	24.7	25.0	22.7	23.8	23.1	24.1	24.4
6H	23.3	24.4	23.7	24.7	25.0	22.8	23.8	23.1	24.1	24.5
8H	23.4	24.4	23.7	24.7	25.0	22.8	23.8	23.2	24.1	24.5
12H	23.4	24.3	23.8	24.7	25.0	22.8	23.8	23.2	24.1	24.5
X=4H Y=2H	22.8	23.9	23.1	24.2	24.5	22.4	23.5	22.7	23.8	24.1
3H	23.5	24.4	23.8	24.8	25.1	23.0	24.0	23.4	24.3	24.6
4H	23.7	24.5	24.1	24.9	25.2	23.2	24.0	23.6	24.4	24.8
6H	23.8	24.6	24.2	24.9	25.3	23.3	24.1	23.7	24.5	24.9
8H	23.9	24.6	24.3	25.0	25.4	23.4	24.1	23.8	24.5	24.9
12H	23.9	24.6	24.4	25.0	25.4	23.4	24.1	23.9	24.5	24.9
X=8H Y=4H	23.7	24.4	24.1	24.8	25.2	23.2	23.9	23.7	24.3	24.7
6H	23.9	24.5	24.3	24.9	25.4	23.4	24.0	23.9	24.4	24.9
8H	24.0	24.5	24.5	24.9	25.4	23.5	24.0	24.0	24.5	25.0
12H	24.1	24.5	24.6	25.0	25.5	23.7	24.1	24.2	24.6	25.1
X=12H Y=4H	23.6	24.3	24.1	24.7	25.1	23.2	23.8	23.7	24.3	24.7
6H	23.9	24.4	24.4	24.8	25.3	23.4	23.9	23.9	24.4	24.9
8H	24.0	24.4	24.5	24.9	25.4	23.6	24.0	24.1	24.5	25.0
Variations with the observer position at spacings:										
S=1.0H	+0.2/-0.3					+0.3/-0.5				
S=1.5H	+0.6/-1.1					+0.8/-1.6				
S=2.0H	+1.6/-2.7					+1.8/-2.7				

Calculate in accordance with CIE Pub.117. The table is revised with 550lm ($8\log(F/F_0) = -2.1$).



FLUX DISTRIBUTION TABLE BASED ON THE IESNA LUMINAIRE CLASSIFICATION SYSTEM

	ZONE	LUMENS	% LAMP LUMENS
	FORWARD LIGHT	279	50.7
	FL (0°-30°)	86	15.7
	FM (30°-60°)	147	26.7
	FH (60°-80°)	39	7.1
	FVH (80°-90°)	7	1.2
	BACK LIGHT	261	47.4
	BL (0°-30°)	84	15.2
	BM (30°-60°)	137	24.9
	BH (60°-80°)	34	6.1
	BVH (80°-90°)	7	1.2
	UP LIGHT	0	0.0
	UL (90°-100°)	0	0.0
	UH (100°-180°)	0	0.0
	TRAPPED LIGHT	11	1.9

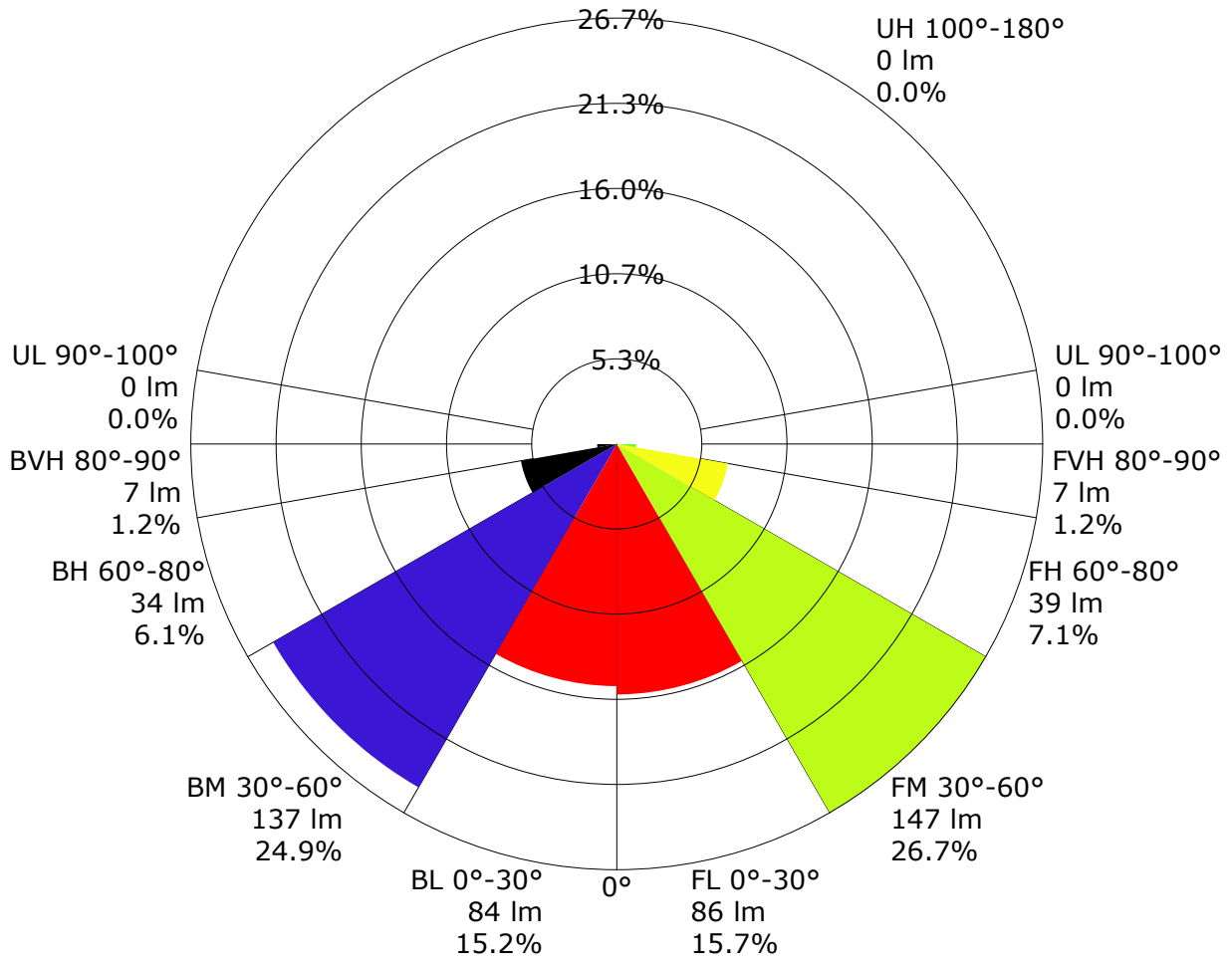
BUG(Backlight,Uplight,Glare) Rating Base On TM-15-07	
Asymmetrical Luminaire Types (Type I,II,III,IV)	B0 U0 G0
Quadrilateral Symmetrical Luminaire Types (Type V,Area Light)	B0 U0 G0

C Plane (°):0.0-360.0: 45.0
 Test Lab: LISUN
 Test Type: TYPE C
 Temperature: 24.5°
 Operator: Jacky

Gamma Plane (°):0.0-90.0:1.0
 Test Device: LSG-1800BCCD
 Distance: 8.000 m
 Humidity: 60%
 Inspector:



LCS Graph



Back Light

Forward Light

Scale= MAX LCS%

Trapped Light:11 lm,1.9%

Color Properties

Chromaticity Coordinate: $x=0.4651$ $y=0.4138$ $u(u')=0.2645$ $v=0.3529$ $v'=0.5293$
 Correlated Color Temperature: $T_c=2653K$ ($duv=0.00074$)

Measurement Flux: 539.5lm, PAR: 2.189W, PPF: 11.100umol/s

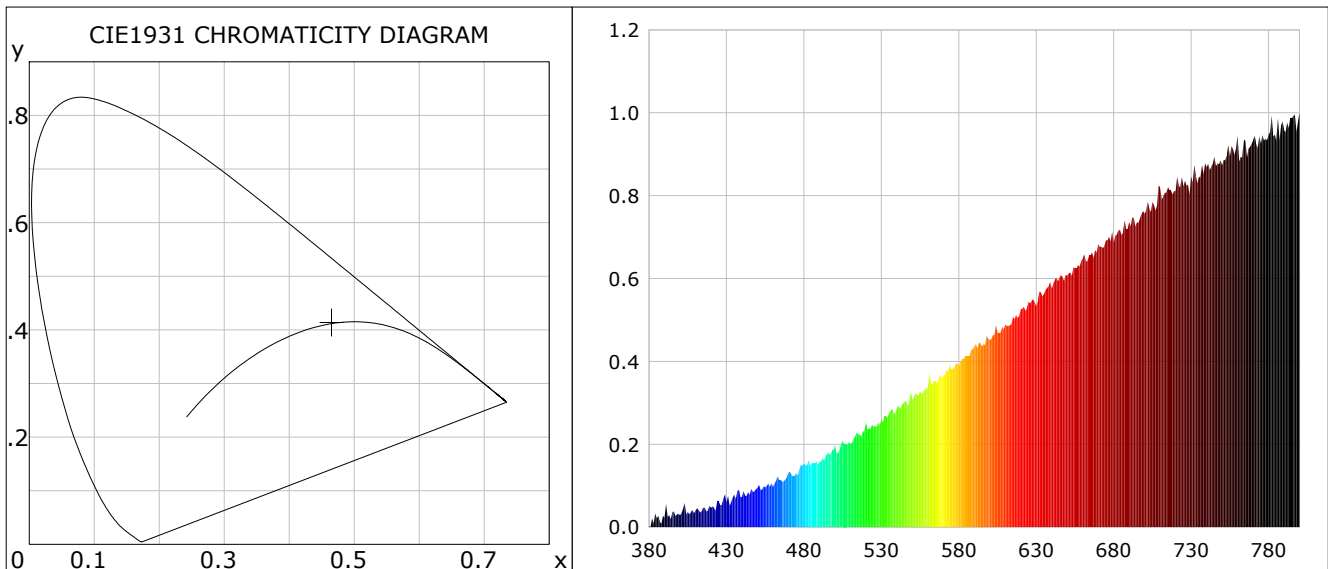
Peak Wavelength: 800nm Half Bandwidth: 185.4nm
 Dominant Wavelength: 584.2nm Color Purity: 0.638

Color Ratio: R=0.269 G=0.704 B=0.027

TM30: Rf=99, Rg=99

Color Render Index: Ra= 99.5
 R1 =99.5 R2 =99.5 R3 =99.5 R4 =99.4 R5 =99.3 R6 =99.1 R7 =99.7 R8 =99.6
 R9 =98.8 R10=98.8 R11=99.3 R12=98.1 R13=99.4 R14=99.7 R15=99.3

Color Quality Scale: Qa= 96.2 Qf= 98.8 Qp= 98.5 Qg= 96.4
 Q1 =96.7 Q2 =97.2 Q3 =97.1 Q4 =96.9 Q5 =96.6 Q6 =96.2 Q7 =95.9 Q8 =95.7
 Q9 =95.0 Q10=95.5 Q11=96.0 Q12=96.5 Q13=96.7 Q14=97.2 Q15=0.0



C Plane (°):0.0-360.0: 45.0
 Test Lab: LISUN
 Test Type: TYPE C
 Temperature: 24.5°
 Operator: Jacky

Gamma Plane (°):0.0-90.0:1.0
 Test Device: LSG-1800BCCD
 Distance: 8.000 m
 Humidity: 60%
 Inspector:



Utilisation Factor Table(Floor cavity)

Utilisation Factors UF(F)			SHR NOM = 1.25									
Room Reflectance			Room Index(RI)									
Ceiling	Wall	Floor	0.75	1.00	1.25	1.50	2.00	2.50	3.00	4.00	5.00	
0.70	0.50	0.20	0.59	0.69	0.76	0.81	0.88	0.92	0.96	1.00	1.02	
	0.30		0.52	0.62	0.70	0.75	0.82	0.87	0.91	0.96	0.99	
	0.20		0.47	0.57	0.64	0.70	0.78	0.83	0.87	0.92	0.96	
0.50	0.50	0.20	0.58	0.67	0.74	0.79	0.85	0.89	0.92	0.96	0.98	
	0.30		0.51	0.61	0.68	0.73	0.80	0.85	0.88	0.93	0.95	
	0.20		0.46	0.56	0.64	0.69	0.76	0.81	0.85	0.90	0.93	
0.30	0.50	0.20	0.56	0.66	0.72	0.76	0.82	0.86	0.89	0.92	0.94	
	0.30		0.51	0.60	0.67	0.72	0.78	0.82	0.86	0.90	0.92	
	0.20		0.46	0.56	0.63	0.68	0.75	0.79	0.83	0.87	0.90	
0.00	0.00	0.00	0.44	0.54	0.60	0.65	0.71	0.76	0.79	0.83	0.86	
<p>Rating:64W Photometrically tested without ceiling board. Multiply UF values by service correction factors Calculate in accordance with CIBSE Technical Memorandum NO.5 1980</p>												



Utilisation Factor Table(Wall)

Utilisation Factors UF(W)			SHR NOM = 1.25									
Room Reflectance			Room Index(RI)									
Ceiling	Wall	Floor	0.75	1.00	1.25	1.50	2.00	2.50	3.00	4.00	5.00	
0.70	0.50	0.20	0.92	0.75	0.64	0.55	0.44	0.37	0.31	0.25	0.20	
	0.30		0.77	0.64	0.56	0.49	0.40	0.34	0.29	0.23	0.19	
	0.20		0.66	0.56	0.49	0.44	0.36	0.31	0.27	0.22	0.18	
0.50	0.50	0.20	0.89	0.72	0.61	0.53	0.42	0.38	0.30	0.23	0.19	
	0.30		0.75	0.63	0.54	0.47	0.38	0.32	0.28	0.22	0.18	
	0.20		0.65	0.55	0.48	0.43	0.35	0.30	0.26	0.21	0.18	
0.30	0.50	0.20	0.86	0.69	0.59	0.51	0.40	0.33	0.29	0.22	0.18	
	0.30		0.74	0.61	0.52	0.46	0.37	0.31	0.27	0.21	0.18	
	0.20		0.65	0.55	0.47	0.42	0.34	0.29	0.25	0.20	0.17	
0.00	0.00	0.00	0.54	0.45	0.38	0.33	0.27	0.23	0.19	0.15	0.13	
<p>Rating:64W Photometrically tested without ceiling board. Multiply UF values by service correction factors Calculate in accordance with CIBSE Technical Memorandum NO.5 1980</p>												



Utilisation Factor Table(Ceiling cavity)

Utilisation Factors UF(C)			SHR NOM = 1.25									
Room Reflectance			Room Index(RI)									
Ceiling	Wall	Floor	0.75	1.00	1.25	1.50	2.00	2.50	3.00	4.00	5.00	
0.70	0.50	0.20	0.16	0.17	0.18	0.18	0.19	0.20	0.20	0.21	0.21	
	0.30		0.09	0.11	0.12	0.13	0.15	0.16	0.17	0.18	0.19	
	0.20		0.05	0.06	0.08	0.09	0.11	0.13	0.14	0.16	0.17	
0.50	0.50	0.20	0.15	0.16	0.17	0.18	0.19	0.19	0.19	0.20	0.20	
	0.30		0.09	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	
	0.20		0.05	0.06	0.08	0.09	0.11	0.12	0.14	0.15	0.16	
0.30	0.50	0.20	0.15	0.16	0.16	0.17	0.18	0.18	0.19	0.19	0.19	
	0.30		0.09	0.10	0.12	0.13	0.14	0.15	0.16	0.17	0.18	
	0.20		0.05	0.06	0.08	0.09	0.11	0.12	0.13	0.15	0.16	
0.00	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	
<p>Rating:64W Photometrically tested without ceiling board. Multiply UF values by service correction factors Calculate in accordance with CIBSE Technical Memorandum NO.5 1980</p>												

Zonal Lumen

Gamma [°]	I _{mean} [cd/klm]	Zonal Flux [lm]	Sum Zonal Flux [lm]	Rel Zonal Flux [%]	Sum Rel Zonal Flux [%]
0.0-1.0	419.2	0.2	0.2	0.04	0.04
1.0-2.0	419.0	0.7	0.9	0.12	0.16
2.0-3.0	418.8	1.1	2.0	0.20	0.36
3.0-4.0	418.4	1.5	3.5	0.28	0.64
4.0-5.0	417.8	2.0	5.5	0.36	1.00
5.0-6.0	417.0	2.4	7.9	0.44	1.44
6.0-7.0	416.1	2.8	10.8	0.52	1.96
7.0-8.0	414.7	3.3	14.0	0.59	2.55
8.0-9.0	413.0	3.7	17.7	0.67	3.22
9.0-10.0	411.1	4.1	21.8	0.74	3.96
10.0-11.0	409.0	4.5	26.3	0.82	4.78
11.0-12.0	406.6	4.9	31.2	0.89	5.67
12.0-13.0	403.9	5.3	36.4	0.96	6.63
13.0-14.0	400.7	5.6	42.1	1.03	7.65
14.0-15.0	397.1	6.0	48.1	1.09	8.74
15.0-16.0	393.3	6.3	54.4	1.15	9.90
16.0-17.0	389.1	6.7	61.1	1.21	11.11
17.0-18.0	384.7	7.0	68.1	1.27	12.38
18.0-19.0	379.9	7.3	75.3	1.32	13.70
19.0-20.0	374.9	7.5	82.9	1.37	15.07
20.0-21.0	369.6	7.8	90.7	1.42	16.49
21.0-22.0	364.0	8.0	98.7	1.46	17.95
22.0-23.0	358.4	8.3	107.0	1.50	19.46
23.0-24.0	352.7	8.5	115.5	1.54	21.00
24.0-25.0	346.9	8.7	124.2	1.58	22.58
25.0-26.0	341.0	8.9	133.0	1.61	24.19
26.0-27.0	335.1	9.0	142.0	1.64	25.83
27.0-28.0	329.1	9.2	151.2	1.67	27.49
28.0-29.0	323.2	9.3	160.5	1.69	29.18
29.0-30.0	317.4	9.4	169.9	1.71	30.90
30.0-31.0	311.6	9.5	179.5	1.73	32.63
31.0-32.0	306.0	9.6	189.1	1.75	34.39
32.0-33.0	300.5	9.7	198.9	1.77	36.16
33.0-34.0	295.1	9.8	208.7	1.79	37.94
34.0-35.0	289.8	9.9	218.6	1.80	39.74
35.0-36.0	284.6	10.0	228.6	1.81	41.55

C Plane (°): 0.0-360.0: 45.0
 Test Lab: LISUN
 Test Type: TYPE C
 Temperature: 24.5°
 Operator: Jacky

Gamma Plane (°): 0.0-90.0: 1.0
 Test Device: LSG-1800BCCD
 Distance: 8.000 m
 Humidity: 60%
 Inspector:



Zonal Lumen (Continue 1)

Gamma [°]	I _{mean} [cd/klm]	Zonal Flux [lm]	Sum Zonal Flux [lm]	Rel Zonal Flux [%]	Sum Rel Zonal Flux [%]
36.0-37.0	279.5	10.0	238.6	1.82	43.38
37.0-38.0	274.5	10.1	248.7	1.83	45.21
38.0-39.0	269.7	10.1	258.8	1.84	47.05
39.0-40.0	264.9	10.2	268.9	1.85	48.90
40.0-41.0	259.8	10.2	279.1	1.85	50.75
41.0-42.0	254.9	10.2	289.3	1.85	52.60
42.0-43.0	250.1	10.2	299.5	1.85	54.46
43.0-44.0	245.1	10.2	309.7	1.85	56.31
44.0-45.0	240.0	10.1	319.8	1.84	58.15
45.0-46.0	234.7	10.1	329.9	1.84	59.99
46.0-47.0	229.3	10.0	340.0	1.82	61.81
47.0-48.0	223.6	9.9	349.9	1.81	63.62
48.0-49.0	217.8	9.8	359.7	1.79	65.41
49.0-50.0	211.7	9.7	369.4	1.77	67.17
50.0-51.0	205.1	9.5	379.0	1.74	68.91
51.0-52.0	198.2	9.4	388.3	1.70	70.61
52.0-53.0	191.1	9.1	397.5	1.66	72.27
53.0-54.0	183.6	8.9	406.4	1.62	73.89
54.0-55.0	175.9	8.6	415.0	1.57	75.46
55.0-56.0	167.8	8.3	423.4	1.52	76.98
56.0-57.0	159.5	8.0	431.4	1.46	78.43
57.0-58.0	151.0	7.7	439.1	1.40	79.83
58.0-59.0	142.4	7.3	446.4	1.33	81.16
59.0-60.0	133.8	7.0	453.3	1.26	82.43
60.0-61.0	125.2	6.6	459.9	1.19	83.62
61.0-62.0	116.6	6.2	466.1	1.12	84.75
62.0-63.0	108.3	5.8	471.9	1.05	85.80
63.0-64.0	100.2	5.4	477.3	0.98	86.78
64.0-65.0	92.5	5.0	482.3	0.92	87.70
65.0-66.0	85.2	4.7	487.0	0.85	88.55
66.0-67.0	78.3	4.3	491.4	0.79	89.34
67.0-68.0	71.9	4.0	495.4	0.73	90.07
68.0-69.0	66.0	3.7	499.1	0.67	90.74
69.0-70.0	60.6	3.4	502.5	0.62	91.36
70.0-71.0	55.7	3.2	505.6	0.58	91.94
71.0-72.0	51.2	2.9	508.6	0.53	92.47

C Plane (°):0.0-360.0: 45.0
Test Lab: LISUN
Test Type: TYPE C
Temperature: 24.5°
Operator: Jacky

Gamma Plane (°):0.0-90.0:1.0
Test Device: LSG-1800BCCD
Distance: 8.000 m
Humidity: 60%
Inspector:



Candlepower Table

Unit: cd/klm

G\C	C0.0	C45.0	C90.0	C135.0	C180.0	C225.0	C270.0	C315.0	C360.0	
G0.0	417.8	423.7	420.2	415.6	417.8	423.7	420.2	415.6	417.8	
G1.0	418.7	424.6	420.7	414.8	416.6	422.4	419.6	415.9	418.7	
G2.0	419.5	425.7	420.7	414.2	415.1	421.1	418.8	415.9	419.5	
G3.0	420.2	427.1	421.2	413.2	413.8	419.7	417.9	415.8	420.2	
G4.0	421.0	428.1	420.7	412.2	412.4	418.8	416.7	415.4	421.0	
G5.0	421.9	428.2	420.5	410.8	410.7	416.9	415.0	414.7	421.9	
G6.0	423.5	428.6	420.8	409.3	408.7	414.9	413.1	414.4	423.5	
G7.0	423.3	429.1	419.9	407.2	406.4	413.2	411.4	413.2	423.3	
G8.0	421.6	429.3	418.8	405.1	404.3	411.0	409.4	411.6	421.6	
G9.0	420.9	429.0	417.5	402.8	401.6	408.1	406.9	409.7	420.9	
G10.0	420.1	428.6	416.2	400.2	398.4	405.5	404.1	407.9	420.1	
G11.0	419.3	427.9	414.5	397.3	395.6	402.0	401.2	405.8	419.3	
G12.0	418.1	426.7	412.3	394.1	392.1	398.3	397.7	402.9	418.1	
G13.0	416.7	425.2	410.0	391.1	388.6	394.1	394.0	400.1	416.7	
G14.0	414.5	422.8	407.0	386.9	384.6	389.4	390.0	396.8	414.5	
G15.0	412.1	420.1	403.7	383.1	380.4	384.4	385.2	393.2	412.1	
G16.0	409.3	416.9	400.1	378.9	375.8	379.0	380.6	389.5	409.3	
G17.0	406.1	412.8	396.2	374.6	371.1	373.5	375.9	385.5	406.1	
G18.0	402.4	409.1	392.5	369.8	366.0	367.7	370.5	381.1	402.4	
G19.0	398.4	404.2	388.3	365.4	360.7	361.7	364.7	376.5	398.4	
G20.0	393.8	399.0	383.1	360.1	355.4	355.9	359.7	371.4	393.8	
G21.0	389.1	393.1	378.1	355.0	349.4	349.7	353.9	366.2	389.1	
G22.0	383.8	387.7	372.8	349.6	343.2	343.3	348.1	361.4	383.8	
G23.0	378.3	381.9	367.6	344.1	337.2	337.5	342.1	355.4	378.3	
G24.0	373.1	376.4	361.6	338.7	331.5	331.7	336.4	349.9	373.1	
G25.0	367.2	370.3	356.1	332.9	325.2	325.6	330.3	344.1	367.2	
G26.0	360.6	364.3	349.9	327.3	319.3	320.1	324.9	338.3	360.6	
G27.0	354.6	358.0	344.6	320.8	313.3	314.5	319.0	332.1	354.6	
G28.0	348.1	352.1	338.6	315.0	307.1	308.9	313.3	325.7	348.1	
G29.0	342.0	346.3	333.1	309.5	301.3	303.3	307.9	319.2	342.0	
G30.0	335.5	340.2	327.0	303.6	295.3	298.1	302.7	312.7	335.5	
G31.0	329.6	334.4	321.5	297.8	289.7	292.9	297.5	306.5	329.6	
G32.0	323.4	329.1	316.2	292.4	284.1	288.1	292.0	300.5	323.4	
G33.0	317.8	323.7	310.5	287.0	278.7	283.3	287.1	294.4	317.8	
G34.0	312.0	317.9	305.0	281.6	273.2	278.7	282.4	287.9	312.0	
G35.0	306.3	312.5	299.8	276.4	267.9	274.6	277.8	282.2	306.3	
G36.0	300.7	307.2	294.6	271.1	262.6	270.5	273.2	276.7	300.7	

C Plane (°):0.0-360.0: 45.0
Test Lab: LISUN
Test Type: TYPE C
Temperature: 24.5°
Operator: Jacky

Gamma Plane (°):0.0-90.0:1.0
Test Device: LSG-1800BCCD
Distance: 8.000 m
Humidity: 60%
Inspector:



Candlepower Table (Continue 1)

Unit: cd/klm

G\C	C0.0	C45.0	C90.0	C135.0	C180.0	C225.0	C270.0	C315.0	C360.0
G37.0	294.9	302.1	289.5	265.8	257.5	266.5	268.7	271.0	294.9
G38.0	289.4	296.6	284.9	260.6	252.6	262.3	264.2	265.6	289.4
G39.0	284.1	291.3	279.9	255.6	249.6	258.6	259.8	259.9	284.1
G40.0	278.8	286.3	274.7	250.7	243.8	254.5	255.2	254.9	278.8
G41.0	273.7	281.2	269.8	245.4	237.9	250.4	250.7	249.1	273.7
G42.0	269.1	276.5	265.3	240.3	232.6	246.3	246.3	244.0	269.1
G43.0	264.1	271.8	262.0	234.9	227.0	241.8	241.5	238.7	264.1
G44.0	259.6	266.9	256.2	229.1	221.7	236.8	236.7	233.3	259.6
G45.0	254.8	262.4	251.6	223.6	216.1	231.4	231.4	227.7	254.8
G46.0	250.1	258.8	246.5	217.6	209.6	225.7	225.7	222.2	250.1
G47.0	245.3	253.6	242.3	211.5	203.6	219.5	220.0	216.4	245.3
G48.0	240.2	249.4	237.6	205.2	196.9	212.6	213.7	210.4	240.2
G49.0	235.3	244.7	233.0	198.3	190.0	205.9	207.0	204.8	235.3
G50.0	229.7	240.2	227.6	191.4	182.8	198.2	200.0	198.0	229.7
G51.0	224.5	235.2	221.8	184.1	175.1	189.9	192.5	190.7	224.5
G52.0	218.6	230.2	216.1	176.4	167.3	181.6	184.6	183.4	218.6
G53.0	212.6	224.4	210.1	168.3	159.0	172.8	176.2	175.7	212.6
G54.0	205.9	218.4	203.1	160.6	151.1	164.0	167.7	168.3	205.9
G55.0	199.1	211.4	196.3	152.0	142.5	154.7	159.1	160.3	199.1
G56.0	191.5	204.0	188.3	143.7	134.1	145.2	150.6	152.2	191.5
G57.0	183.9	196.0	180.4	135.0	125.2	135.8	141.4	143.9	183.9
G58.0	175.7	187.9	171.4	126.6	116.8	127.0	132.8	135.8	175.7
G59.0	166.9	178.7	162.5	117.9	108.7	118.3	123.7	127.8	166.9
G60.0	158.3	169.4	153.1	109.9	101.2	109.5	115.5	119.5	158.3
G61.0	148.7	159.3	143.6	101.6	93.4	101.2	107.0	111.6	148.7
G62.0	139.5	149.3	133.9	93.9	86.6	93.4	99.1	103.8	139.5
G63.0	129.9	138.9	124.3	86.4	79.6	86.1	91.5	96.4	129.9
G64.0	120.7	129.1	114.7	79.9	73.4	79.2	84.6	89.0	120.7
G65.0	111.4	118.9	105.5	73.3	67.7	72.7	77.8	82.5	111.4
G66.0	102.8	109.5	96.6	67.3	62.5	67.2	72.0	76.0	102.8
G67.0	93.9	99.8	88.5	61.9	57.5	61.8	66.1	70.0	93.9
G68.0	86.1	91.4	80.8	56.9	53.0	57.3	61.1	64.5	86.1
G69.0	78.3	83.3	73.3	52.1	49.1	52.8	56.5	59.6	78.3
G70.0	71.4	75.8	67.0	48.2	45.6	49.1	52.1	55.2	71.4
G71.0	64.9	69.1	60.7	44.4	42.4	45.6	48.1	51.2	64.9
G72.0	59.2	62.5	55.5	41.2	39.6	42.4	44.9	47.4	59.2
G73.0	53.9	56.7	50.6	38.0	36.9	39.6	41.8	44.2	53.9

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Test Device: LSG-1800BCCD
Distance: 8.000 m
Humidity: 60%
Inspector:

