SUMMARY

Test Condition: 15V 60Hz for SL19

Criteria	Result
Total Lumen Output (lm)	16.438
Total Power(W)	0.8415
Lamp Luminaire Efficacy (lm/W)	19.53
Power Factor	0.6083
Field Angle (°)	144.5
Correlated Color Temperature (CCT)	3063
Color Rendering Index (CRI)	98
Color Rendering Index (R_9)	96
Fidelity Index (Rf)	96
Gamut Index (Rg)	102
Chromaticity Coordinate (x)	0.4349
Chromaticity Coordinate (y)	0.4077
Chromaticity Coordinate (u')	0.2477
Chromaticity Coordinate (v')	0.5225
In-situ Case Temperature of LED/COB (°C)	36.7
Drive Current of LED/COB (mA)	220
Projection Life Time, Reported L70 (hours)	>60000

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EQUIPMENT LIST

Equipment Used	Model Number	Control Number
Fluke Temperature Meter	52	EC2357
Everfine- DC Power Supply	WY12010	EC4753-7
Everfine- AC power source for Integrating Sphere System	VPS1010 PWM	EC4760-12
Everfine - AC power source for Goniophotometer System	VPS1060 PWM	EC4753-8
Two meter integrating sphere unit	Everfine – 2M	EC4760
Everfine - Digital Power Meter	PF2010A	EC4760-10
YOKOGAWA - Digital Power Meter	WT210	EC4553
Everfine – Goniophotometer	Go-R5000	EC4753
Draught-proof enclosure	N/A	EC2201
Agilent - Data Acquisition Unit	34970A	EC2043
QINGZHI - Power Meter	8770A	EC2652
YOKOGAWA - Digital Power Meter	WT-210	EC4553

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TEST METHOD

Seasoning in Sample Orientation – LED Products

No seasoning was performed in accordance with IESNA LM-79

Light Distribution and Output Measurements

Light Distribution and totel light output (luminous flux) were measured using a Go-R5000 Type-C Rotating Mirror Goniophotometer. Temperature 25ºC and relative humidity of 60% was measured at a position in the testing laboratory.

The lamp rotates only around the fixed vertical axle in the prescribed burning position. The lamp and mirror permit the measurement of luminous intensity at the direction of any horizontal or vertical angle without tilting the lamp. The lamp was allowed to stabilize before measurements were made.

Chromaticity Measurements

Chromaticity was measured using a 2 meters integrating sphere spectral lamp measurement system. Temperature was measured at a position inside the sphere shielded from direct light. Relative humidity of 65% was measured at a position in the testing laboratory.

Spectral radiant flux measurements were made using spectroradiometer attached to the detector port of the integrating sphere. Each lamp was allowed to stabilise before measurements were made. The calibration of the integrating sphere spectroradiometer system is by the reference/standard lamps which are traceable to National Institute of Metrology P.R. CHINA. Lamp efficacy (lumens per watt) for each lamp model was then computed based on the luminous flux result. Electrical measurements including voltage, power and power factor were measured using YOKOGAWA - Digital Power Meter., model WT210.

Standard lamp used:
Model: Labsphere SCL-1400
Current: 2.679A

Temperature Measurement Test

The sample was operated at 25±5°C until constant temperatures were obtained. A temperature was considered constant if sample was operating for at least three hours and upon three successive readings-taken at 15 minutes intervals- were within one degree and were not rising.

Thermocouples were attached at locations described in the results by means of epoxy.

Driver current Measurement Test

During the temperature measurement test, measure the forward current for each
LED package/array/module.

********** End of Page **********

RESULTS OF TESTS

Test Condition: 15V 60Hz for SL19

Total operation burning time: 70 min
Stabilization time: 60 min

Photometric Measurements at 25°C

Intertek Sample No.	Base Orientation	Correlated Color Temperature (K)	CRI	CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
SL19							
A241226-10-001	N/A	3063	98	0.4349	0.4077	0.2477	0.5225

Photometric and Electrical Measurements at 25°C

Intertek Sample No.	Base Orientation	Input Voltage (Vac)	Input Current (A)	Lamp Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
SL19							
A241226-10-001	N/A	15.0	0.0920	0.8415	0.6083	16.438	19.53

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens (lm)	% Luminaire (%)
SL19		
0-30	5.181	31.5
0-40	8.345	50.8
0-60	14.04	85.4
0-90	16.44	100.0
0-180	16.44	100.0

Beam Angle

	Horizontal Spread (°)	Vertical Spread (°)
SL19		
Beam (50%)	105.2	94.4
Beam Angle	99.8	

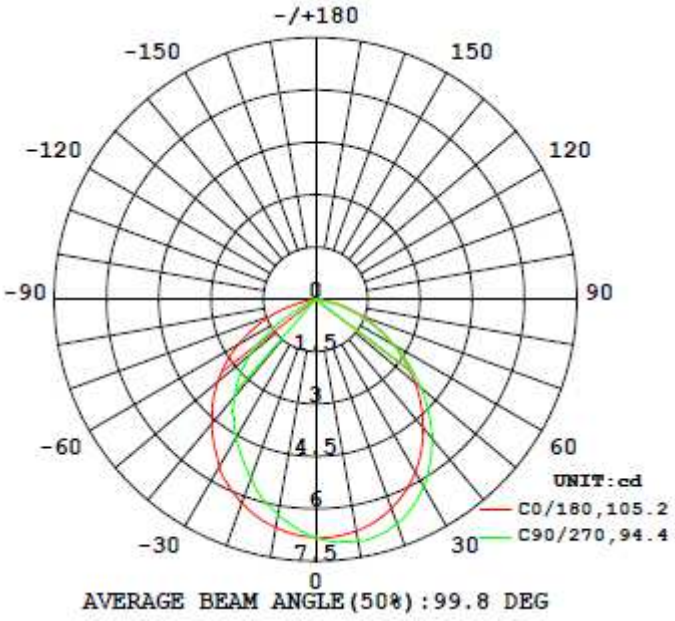
********** End of Page **********

RESULTS OF TESTS (cont'd)

Intensity (Candlepower) Summary at 25°C – Candelas

Test Condition: 15V 60Hz for SL19

G \ C(°)	0	22.5	45	67.5	90
0	6.819	6.819	6.819	6.819	6.819
5	6.813	6.876	6.925	6.956	6.983
10	6.737	6.854	6.941	6.992	7.044
15	6.587	6.745	6.857	6.918	6.997
20	6.370	6.548	6.666	6.737	6.840
25	6.075	6.258	6.375	6.441	6.570
30	5.718	5.885	5.986	6.046	6.198
35	5.292	5.437	5.513	5.561	5.734
40	4.810	4.924	4.974	5.006	5.192
45	4.285	4.359	4.383	4.398	4.591
50	3.734	3.763	3.753	3.757	3.956
55	3.163	3.146	3.105	3.095	3.292
60	2.564	2.501	2.435	2.408	2.602
65	1.997	1.893	1.800	1.761	1.945
70	1.444	1.305	1.191	1.143	1.314
75	0.923	0.761	0.640	0.590	0.735
80	0.456	0.303	0.201	0.163	0.261
85	0.105	0.028	0.013	0.011	0.016
90	0.017	0.006	0.009	0.007	0.007



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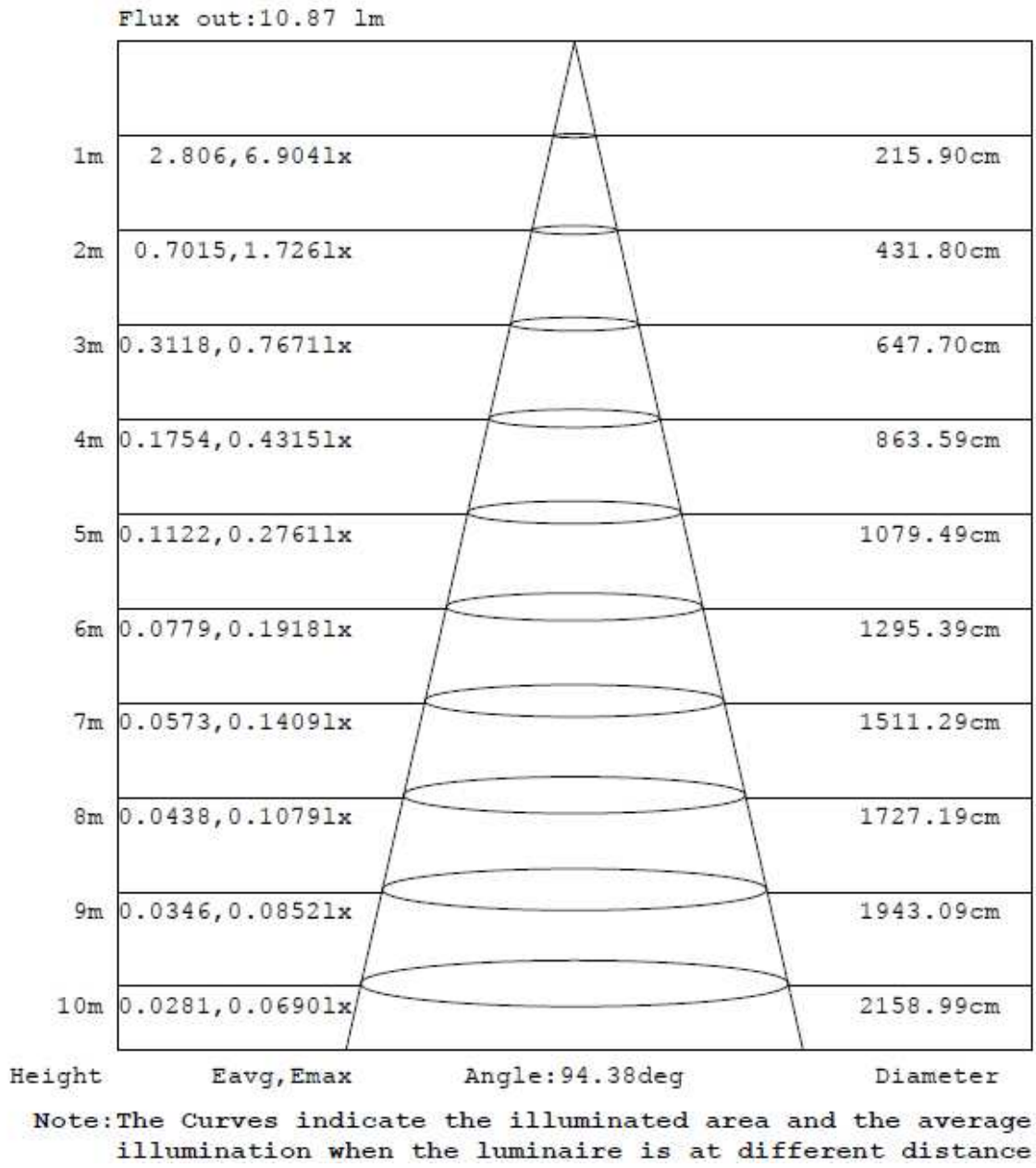
RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL19

Illumination Plots

Model No.: SL19
Mount Height: 10 m

Illuminance - Cone of Light



Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

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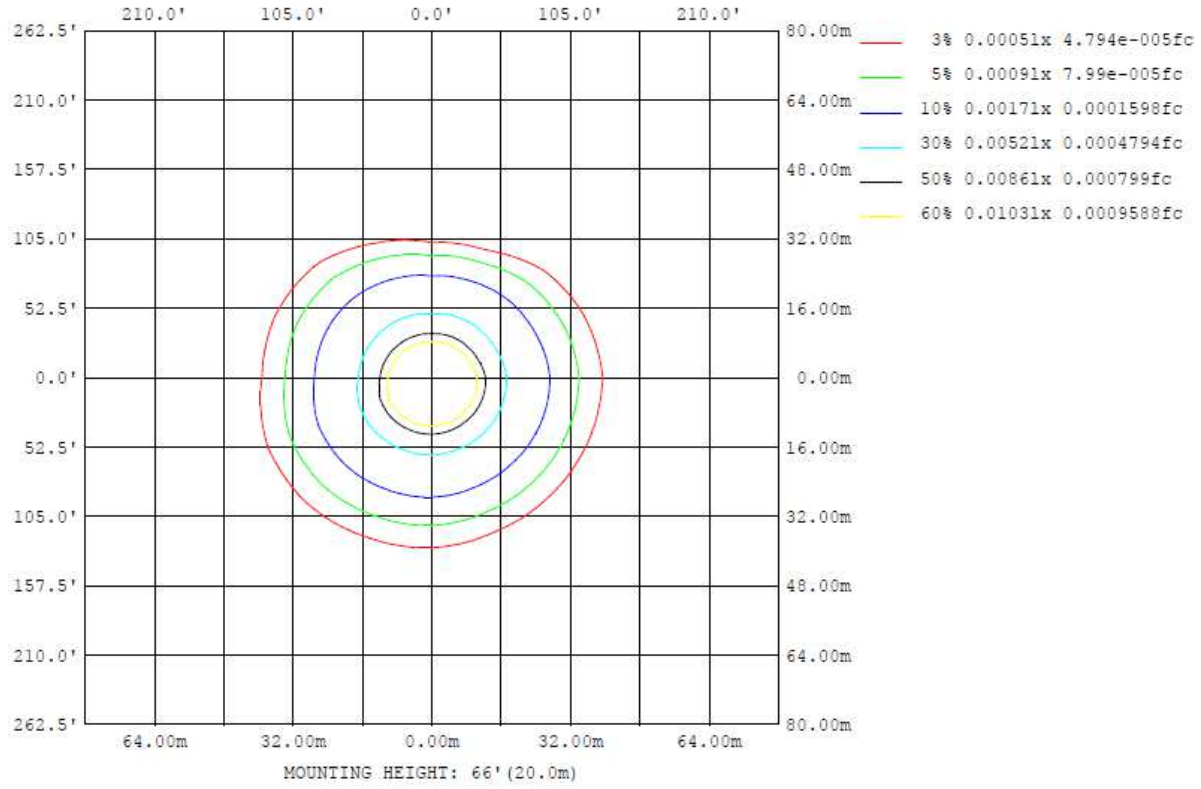
RESULTS OF TESTS (cont'd)

Test Condition: 15V 60Hz for SL19

Model No.: SL19
Mount Height: 20 m
Isoillumination Plot



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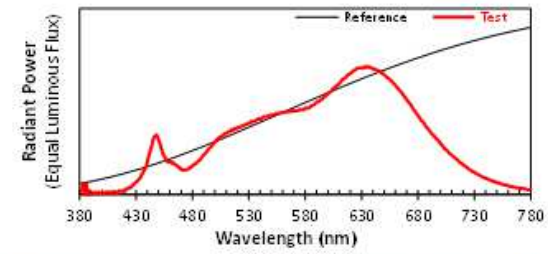
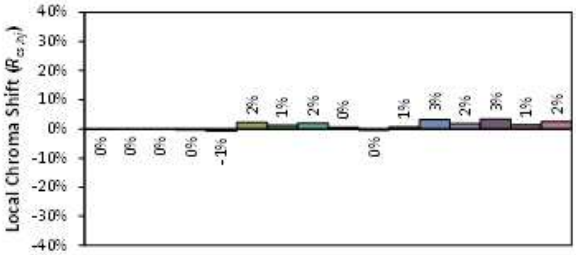
RESULTS OF TESTS (cont'd)

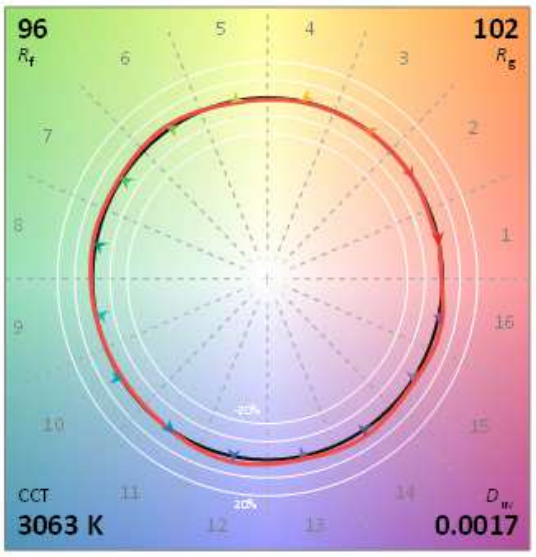
Test Condition: 15V 60Hz for SL19

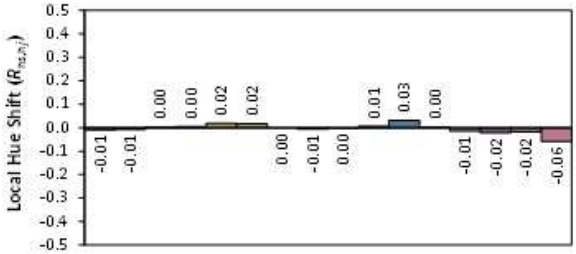
ANSI/IES TM-30-18 Color Rendition Report

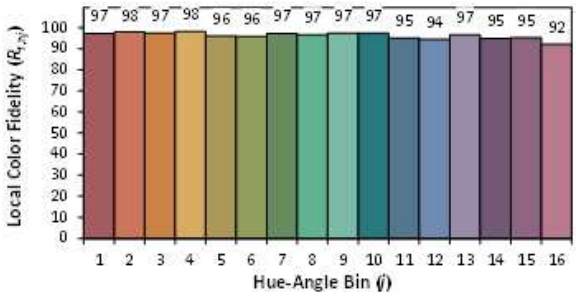
Source:	LED	**Manufacturer:**	STERLING LIGHTING LLC
Date:	1/3/2025	**Model:**	SL19

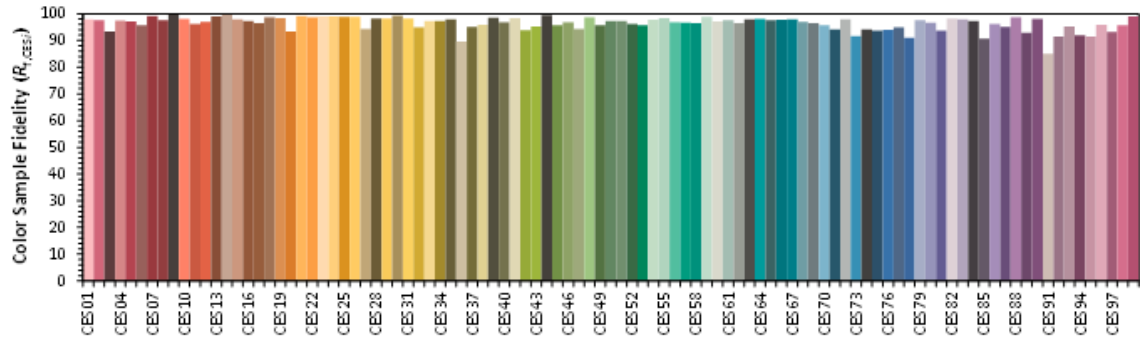












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.4349
y	0.4077
u'	0.2477
v'	0.5225

CIE 13.3-1995 (CRI)

R_a	98
R_9	96

********** End of Page **********

RESULTS OF TESTS (cont'd)

IN SITU TEMPERATURE MEASUREMENT TEST

Test Results of LED chip temperature and current

TMP led: BXEX-30H-11H-3A-00-0-0	
In-situ case temperature of LED source (°C)	Limit single led chip temperature(℃)
36.7	105
Measured Drive current for each LED package/array/module (mA)	Limit single led chip current (mA)
220	1000

Note: In-situ case temperature was corrected to ambient temperature at 25°C in above table.

********** End of Page **********

RESULTS OF TESTS (cont'd)

IN SITU TEMPERATURE MEASUREMENT TEST

Lumen Maintenance Life Projection (Cont'd) - led chip point 1

The Calculation is based on the Illumination Engineering Society's TM-21-11: Projecting Long Term Lumen Maintenance of LED Light Sources.

Table 1: Report at each LM-80 Test Condition					
Description of LED Light Source Tested (manufacturer, model, catalog number)	Manufacturer: Bridgelux Inc. Model: BXEX-30H-11H-3A-00-0-0 Report Number: R2XM200324050-10 Issued: Mar. 25, 2020				
Test Condition 1 - 55ºC Case Temp		**Test Condition 2 - 85ºC Case Temp**		**Test Condition 3 - 105ºC Case Temp**	
Sample size	25	Sample size	25	Sample size	25
Number of failures	0	Number of failures	0	Number of failures	0
DUT drive current used in the test (mA)	1000	DUT drive current used in the test (mA)	1000	DUT drive current used in the test (mA)	1000
Test duration (hours)	10,000	Test duration (hours)	10,000	Test duration (hours)	10,000
Test duration used for projection (hour to hour)	5,000 - 10,000	Test duration used for projection (hour to hour)	5,000 - 10,000	Test duration used for projection (hour to hour)	5,000 - 10,000
Tested case temperature (ºC)	55	Tested case temperature (ºC)	85	Tested case temperature (ºC)	105
α	1.581E-06	α	2.091E-06	α	2.941E-06
B	1.002	B	1.002	B	1.003
Reported L70(10k) (hours)	>60000	Reported L70(10k) (hours)	>60000	Reported L70(10k) (hours)	>60000

Table 2: Interpolation Report (projection based on *in-situ* temperature entered)	
$T_{s,1}$ (ºC)	55.00
$T_{s,1}$ (K)	328.15
α_1	1.581E-06
B_1	1.002
$T_{s,2}$ (ºC)	-
$T_{s,2}$ (K)	-
α_2	-
B_2	-
E_a/k_b	-
A	-
B_0	1.002
$T_{s,i}$ (ºC)	36.70
$T_{s,i}$ (K)	309.85
α_i	1.581E-06
Reported L70(10k) at 36.7ºC (hours)	>60000

***In-Situ* Inputs**	
Drive current for each LED package/array/module (mA):	220
In-situ case temperature (T_c, ºC):	36.7
Percentage of initial lumens to project to (e.g. for L_{70}, enter 70):	70

Results

Time (t) at which to estimate lumen maintenance (hours):	50,000
Lumen maintenance at time (t) (%):	92.62%
Reported L70 (hours):	>60000

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