

# Photometric Test Report

## Relevant Standards

- ☒ IES LM-79-2008
- ☒ ANSI C82.77:2017

## Prepared For

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## Project Number

**DLF2102103**

## Report Number

**DLF2102103-2a**

## Test Date

**2021/2/2**

## Issue Date

**2021/2/5**

## Prepared By



Wangzun Zhu

## Approved By



Kevin Jia

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## 1.0 Test Summary

DLC Technical Requirements v5.1

Indoor - Troffer - 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces				
Requirement Category	Test Method	Requirements		Test value
Luminaire Output (lm) (Goniophotometer - Section 4.2)	IES LM-79-2008	2000		2274
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 110	Premium 125	126.1
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		18.0
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	3.27%
		20.00%	277V	6.69%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.995
		0.9	277V	0.900
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	3985±275	4010
		4 step	3985±154	
Minimum CRI (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥80		84
Minimum R9 (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥0		8
Minimum Rf (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥70		85
Minimum Rg (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥89		94
Minimum IES Rcs,h1 (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	-12%≤IES Rcs,h1≤+23%		-12%
Zonal Lumen Requirement (0°-60°) (Goniophotometer - Section 4.2)	IES LM-79-2008	≥75%		77.08%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<22		20.1
SC: 0-180° (Goniophotometer - Section 4.2)	IES LM-79-2008	1.0-2.0		1.28
SC: 90-270° (Goniophotometer - Section 4.2)	IES LM-79-2008	1.0-2.0		1.28
Input Voltage (V)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		277
(Goniophotometer - Section 4.2)		Non-Wrost Case		120
Input Current (A)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		0.073
(Goniophotometer - Section 4.2)		Non-Wrost Case		0.148
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		18.0
(Goniophotometer - Section 4.2)		Non-Wrost Case		17.7

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2021/2/2	SWISHFA-ISLAND 2x2 / 19W / 4000K	B1
2	Goniophotometer Test	2021/2/2	SWISHFA-ISLAND 2x2 / 19W / 4000K	B1
3	THD and PF Test	2021/2/2	SWISHFA-ISLAND 2x2 / 19W / 4000K	B1

### Remark(If any)

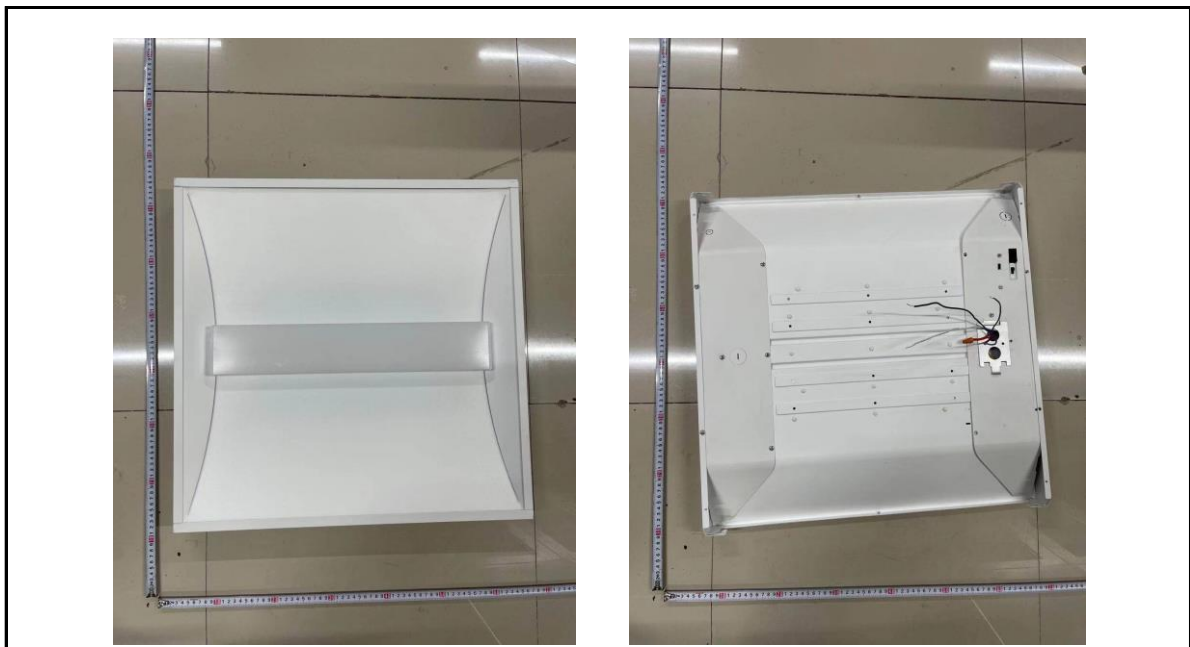
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## 3.0 Production Description

**Luminaire Description:** SWISHFA-ISLAND 2x2 / 19W / 4000K

**Electrical Specification:** 120V-277V,50/60HZ

### Photos of Luminaire Characteristics



## 4.0 LM-79 Measurement and Test Results

### 4.1 Integrating Sphere Test

Model No.	SWISHFA-ISLAND 2x2 / 19W / 4000K	Sample ID.	B1
Operate time (Min.)	90	Stabilization time (Min.)	45
Temperature (°C)	25.3	Humidity (%RH)	56.0

#### Test Method

The samples were tested according to the IES LM-79-2008.

Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ .

The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.

The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within  $\pm 0.2$  percent under load.

The sample was measured using  $4\pi$  geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

#### Test Result

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.09	60	0.148	17.7	0.995
277.03	60	0.072	18.0	0.900

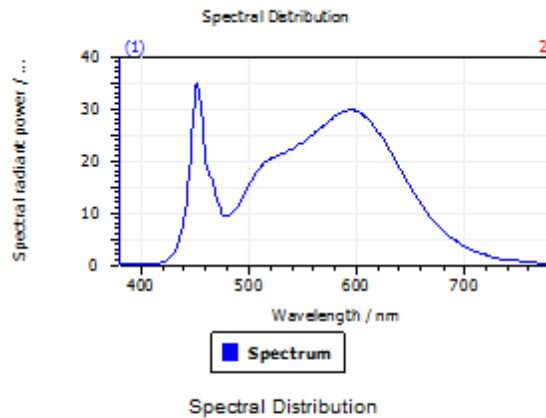
#### Test Result

CCT (K)	CRI	R9	Duv
4010	84	8	0.0033

Rf	Rg	IES Rcs,h1
85	94	-12%

## 4.1 Integrating Sphere Test

### Results



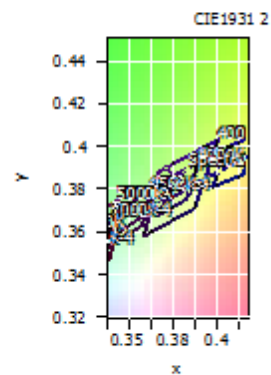
#### Spectral values

DominantWavelength 577.40 nm  
Purity 0.303  
PeakWavelength 451.96 nm  
Radiant Power 5.169 W  
Width50%:

Date: 2021/2/1 13:19:00

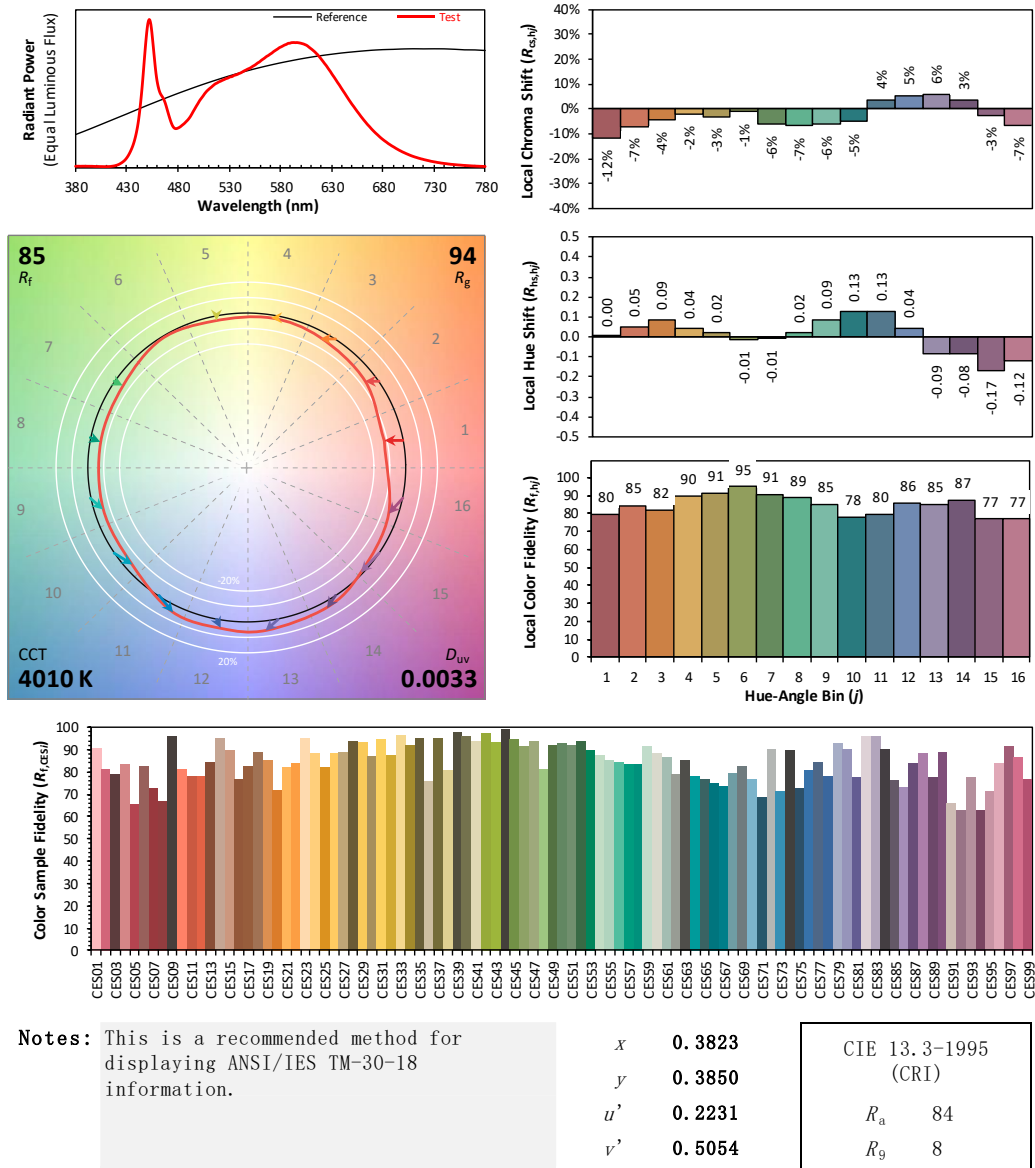
#### Color Coordinates

Correlated Color Temperature 4010 K  
x: 0.3823 u: 0.2231 u': 0.2231  
y: 0.3850 v: 0.3370 v': 0.5054  
CRI01 81.8 CRI09 8.1  
CRI02 90.4 CRI10 77.7  
CRI03 96.5 CRI11 81.6  
CRI04 81.9 CRI12 61.0  
CRI05 81.7 CRI13 84.1  
CRI06 87.0 CRI14 98.5  
CRI07 86.1 CRI15 74.3  
CRI08 64.0 CRI16 71.1  
ResultsCRI 83.7



PlanckDistance 3.3E-003

## 4.1 Integrating Sphere Test



Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.0

## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

Model No.	SWISHFA-ISLAND 2x2 / 19W / 4000K	Sample ID.	B1
Opreate time (Min.)	90	Stabilization time (Min.)	45
Temperature (°C)	25.3	Humidity (%RH)	54.0

#### Test Method

The samples were tested according to the IES LM-79-2008.

Photometric paramters were measured using a type C goniophotometer and software.

The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample.

The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.

The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 0.5° vertical intervals and 10° horizontal intervals.

#### Test Conditions

Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
WROST CASE	277.00	60	0.073	18.0	0.895
NON-WROST CASE	120.01	60	0.148	17.7	0.995

#### Test Result

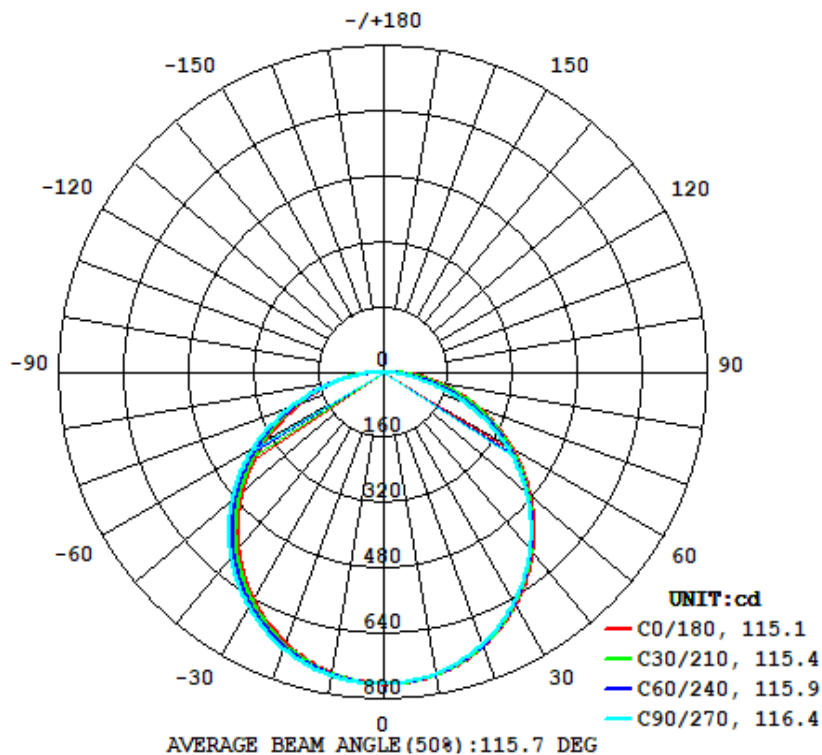
Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
2274	167.2	162.1	115.1	116.4	126.1

Zonal Lumen Requirement (0°-60°)	UGR (X=4H, Y=8H, 70/50/20%)	SC: 0-180°	SC: 90-270°
77.08%	20.1	1.28	1.28

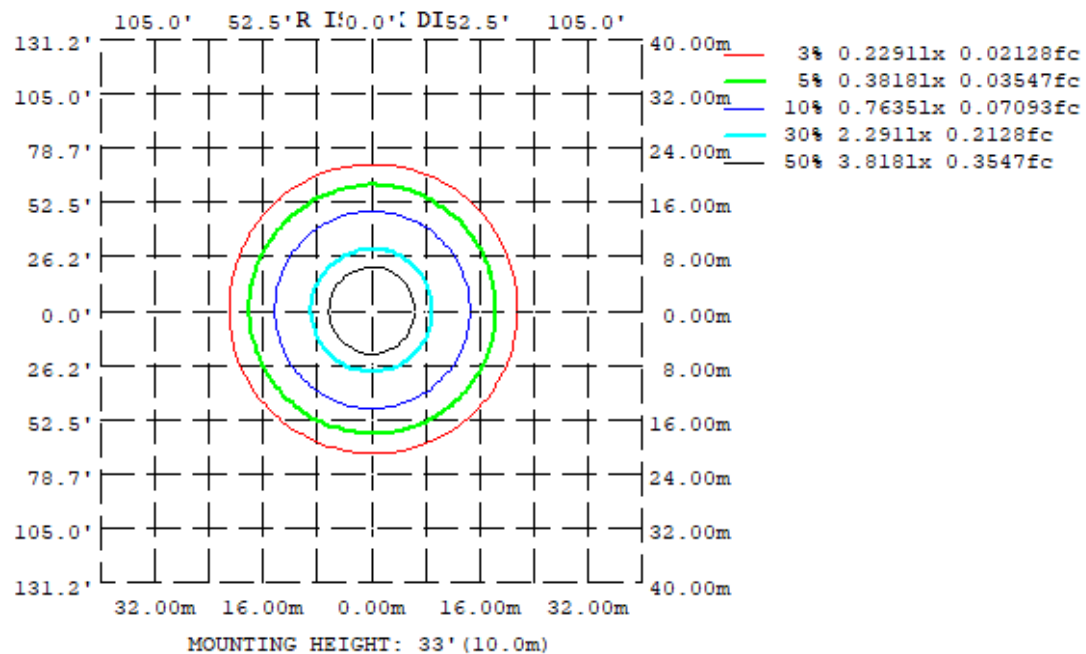


## 4.2 Goniophotometer Test

### Light Distrubtion Curve



### Isolux Plot





## 4.2 Goniophotometer Test

### Zonal Lumen Summary

$\gamma$	C0	C45	C90	C135	C180	C225	C270	C315
10	751.9	749.6	747.7	746.6	747.8	750.4	753.5	753.6
20	715.3	711.4	709.8	705.5	706.5	713.6	720.8	719.7
30	655.4	650.2	647.6	640.7	642.0	652.7	664.3	662.2
40	574.5	568.3	566.4	556.1	557.1	570.6	586.7	583.2
50	476.7	469.2	464.6	453.6	455.0	470.4	488.8	486.1
60	365.8	355.8	345.6	338.2	340.9	356.3	373.4	374.1
70	247.8	233.3	209.9	213.1	221.9	233.0	239.6	252.0
80	131.8	108.8	76.28	90.23	107.7	108.5	104.0	125.7
90	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0
DEG	LUMINOUS INTENSITY:cd							

### UGR Table - Corrected

#### UGR Table - Corrected

Reflectances											
Ceiling Cavity	70	70	50	50	30	70	70	50	50	30	
Walls	50	30	50	30	30	50	30	50	30	30	
Floor Cavity	20	20	20	20	20	20	20	20	20	20	
Room Size		UGR Viewed Crosswise					UGR Viewed Endwise				
X=2H	Y=2H	14.8	16.5	15.2	16.8	17.1	14.5	16.2	14.9	16.5	16.8
	3H	16.9	18.4	17.3	18.7	19.1	16.3	17.8	16.7	18.1	18.5
	4H	17.8	19.2	18.2	19.5	19.9	16.9	18.3	17.3	18.7	19.1
	6H	18.5	19.8	18.9	20.2	20.6	17.3	18.6	17.7	19.0	19.4
	8H	18.8	20.1	19.2	20.5	20.9	17.4	18.7	17.8	19.1	19.5
	12H	19.1	20.3	19.5	20.7	21.1	17.4	18.6	17.9	19.0	19.5
4H	2H	15.5	16.9	15.9	17.3	17.7	15.2	16.6	15.6	16.9	17.3
	3H	17.8	19.0	18.2	19.4	19.8	17.2	18.4	17.6	18.8	19.2
	4H	18.8	19.9	19.3	20.3	20.8	17.9	19.0	18.3	19.4	19.9
	6H	19.8	20.7	20.2	21.2	21.6	18.5	19.4	18.9	19.8	20.3
	8H	20.1	21.0	20.6	21.5	21.9	18.6	19.5	19.0	19.9	20.4
	12H	20.5	21.3	21.0	21.8	22.2	18.6	19.4	19.1	19.9	20.4
8H	4H	19.2	20.1	19.7	20.5	21.0	18.3	19.2	18.8	19.6	20.1
	6H	20.3	21.0	20.8	21.5	22.0	18.9	19.7	19.4	20.2	20.7
	8H	20.8	21.5	21.3	22.0	22.5	19.1	19.8	19.6	20.3	20.8
	12H	21.3	21.9	21.8	22.3	22.9	19.2	19.8	19.7	20.3	20.8
12H	4H	19.2	20.0	19.7	20.5	21.0	18.4	19.2	18.8	19.6	20.1
	6H	20.4	21.1	20.9	21.5	22.1	19.1	19.7	19.6	20.2	20.7
	8H	20.9	21.5	21.4	22.0	22.6	19.3	19.9	19.8	20.4	20.9

Maximum UGR = 22.9

## 4.2 Goniophotometer Test

### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	72.23	0 - 10	72.23	3.18%
10-20	207.34	0 - 20	279.57	12.29%
20-30	315.79	0 - 30	595.36	26.18%
30-40	383.84	0 - 40	979.20	43.06%
40-50	402.95	0 - 50	1382.15	60.78%
50-60	370.70	0 - 60	1752.85	77.08%
60-70	291.10	0 - 70	2043.95	89.88%
70-80	177.49	0 - 80	2221.44	97.69%
80-90	52.64	0 - 90	2274.08	100.00%
90-100	0.00	0 - 100	2274.08	100.00%
100-110	0.00	0 - 110	2274.08	100.00%
110-120	0.00	0 - 120	2274.08	100.00%
120-130	0.00	0 - 130	2274.08	100.00%
130-140	0.00	0 - 140	2274.08	100.00%
140-150	0.00	0 - 150	2274.08	100.00%
150-160	0.00	0 - 160	2274.08	100.00%
160-170	0.00	0 - 170	2274.08	100.00%
170-180	0.00	0 - 180	2274.08	100.00%

## 4.2 Goniophotometer Test

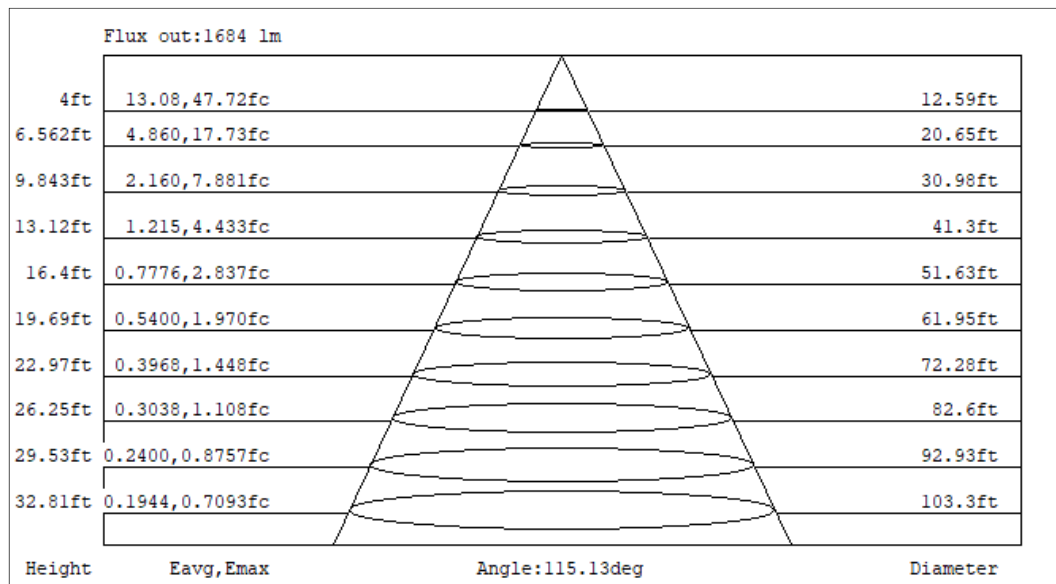
### COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

#### Coefficients Of Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance 0.20

RC	80				70				50			30			10			0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	108	103	99	95	106	101	97	93	97	93	90	93	90	88	89	87	85	83
2	98	90	83	77	96	88	81	76	84	79	74	81	76	72	78	74	71	68
3	89	78	70	63	87	77	69	63	74	67	62	71	65	61	68	64	60	57
4	82	69	60	53	79	68	60	53	65	58	52	63	57	52	61	55	51	49
5	75	62	53	46	73	61	52	46	59	51	45	57	50	45	55	49	44	42
6	69	56	46	40	67	55	46	40	53	45	39	51	44	39	50	43	39	37
7	64	50	41	35	62	50	41	35	48	40	35	47	40	35	45	39	34	32
8	60	46	37	31	58	45	37	31	44	36	31	43	36	31	41	35	31	29
9	56	42	34	28	54	41	34	28	40	33	28	39	33	28	38	32	28	26
10	52	39	31	25	51	38	31	25	37	30	25	36	30	25	35	29	25	23

### CONE OF LIGHT DIAGRAM



## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

Model No.	SWISHFA-ISLAND 2x2 / 19W / 4000K	Sample ID.	B1
Temperature (°C)	25.3	Humidity (%RH)	56.0

#### Test Method

The samples were tested according to the ANSI C82.77:2002.

The total harmonic distortion shall be measured to the 40th order.

The ambient temperature condition was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The sample measurements were made using a digital power meter and power supply. The sample was operated at rated voltage and was stabilized before measurement. The total harmonic distortion were calculated.

#### Test Results

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD
120.09	60	0.148	17.7	0.995	3.27%
277.03	60	0.072	18.0	0.900	6.69%

## 5.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
DLF107	Integrating Sphere System	2020/12/26	2021/12/25
DLF108	Auxiliary Lamp	2020/12/26	2021/12/25
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-derectional	2020/12/26	2021/12/25
DLF116	AC Power Source	2020/12/26	2021/12/25
DLF113	Power Meter	2020/12/26	2021/12/25
DLF112	Temperature Recorder	2020/12/26	2021/12/25
DLF114	Temperature & Humidity Datalogger	2020/12/26	2021/12/25
DLF101	Goniophotometer	2020/12/26	2021/12/25
DLF125	Standard Lamp Standard Lamp Type: 76.58 V, 6.7875 A, Tungsten, Omni-derectional	2020/12/26	2021/12/25
DLF104	AC Power Source	2020/12/26	2021/12/25
DLF507	DC Power Source	2020/12/26	2021/12/25
DLF102	Power Meter	2020/12/26	2021/12/25
DLF111	Temperature & Humidity Datalogger	2020/12/26	2021/12/25
DLF119	Power Meter	2020/12/26	2021/12/25
DLF031	Temperature data logger	2020/12/26	2021/12/25
DLF022	Digital power meter	2020/12/26	2021/12/25
DLF003	Temperature & Humidity Datalogger	2020/12/26	2021/12/25

\*\*\*\*\* End of Test Report\*\*\*\*\*