

# Photometric Test Report

## Relevant Standards

- ☒ IES LM-79-2008
- ☒ ANSI C82.77:2014

## Prepared For

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## Project Number

**DLF1812114**

## Report Number

**DLF1812114-14a**

## Test Date

**2019/1/8**

## Issue Date

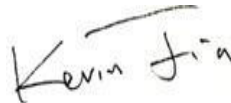
**2019/1/9**

## Prepared By



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## Approved By



Kevin Jia

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## 1.0 Test Summary

DLC Technical Requirements v4.4

<b>Indoor - Troffer/2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces</b>			
<b>Luminaire Description:</b>		EZPANFA2x4 / 40W / 3500K	
<b>Input Control Signal Applied:</b>		0%	
Requirement Category	Test Method	Requirements	Test value
Luminaire Output (lm)	IES LM-79-2008	$\geq 3000$	4609
Zonal Lumen Requirement (0°-60°)	IES LM-79-2008	$\geq 72$	75.92%
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	97	114.4
Allowable CCTs* (K)	IES LM-79-2008	5000	3371
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	78	79
Power Factor	ANSI C82.77:2014	0.873	0.953
Total Harmonic Distortion (A%)	ANSI C82.77:2014	25.00%	8.84%
Power (Input Wattage)	IES LM-79-2008	Worst Case	40.3
Input Voltage	IES LM-79-2008	Worst Case	277
Input Current	IES LM-79-2008	Worst Case	0.153
<b>Luminaire Description:</b>		EZPANFA2x4 / 40W / 4000K	
<b>Input Control Signal Applied:</b>		50%	
Requirement Category	Test Method	Requirements	Test value
Luminaire Output (lm)	IES LM-79-2008	$\geq 3000$	4845
Zonal Lumen Requirement (0°-60°)	IES LM-79-2008	$\geq 72$	76.00%
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	97	125.2
Allowable CCTs* (K)	IES LM-79-2008	5000	4037
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	78	81
Power Factor	ANSI C82.77:2014	0.873	0.952
Total Harmonic Distortion (A%)	ANSI C82.77:2014	25.00%	8.95%
Power (Input Wattage)	IES LM-79-2008	Worst Case	38.7
Input Voltage	IES LM-79-2008	Worst Case	277
Input Current	IES LM-79-2008	Worst Case	0.148

<b>Luminaire Description:</b> EZPANFA2x4 / 40W / 5000K			
<b>Input Control Signal Applied:</b> 100%			
Requirement Category	Test Method	Requirements	Test value
Luminaire Output (lm)	IES LM-79-2008	$\geq 3000$	4578
Zonal Lumen Requirement (0°-60°)	IES LM-79-2008	$\geq 72$	75.92%
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	97	114.2
Allowable CCTs* (K)	IES LM-79-2008	5000	4812
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	78	81
Power Factor	ANSI C82.77:2014	0.873	0.953
Total Harmonic Distortion (A%)	ANSI C82.77:2014	25.00%	8.74%
Power (Input Wattage)	IES LM-79-2008	Worst Case	40.1
Input Voltage	IES LM-79-2008	Worst Case	277
Input Current	IES LM-79-2008	Worst Case	0.153

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2019/1/8	EZPANFA2x4 / 40W / 3500K	C1
2	Goniophotometer Test	2019/1/8	EZPANFA2x4 / 40W / 3500K	C1
3	THD and PF Test	2019/1/8	EZPANFA2x4 / 40W / 3500K	C1
4	Integrating Sphere Test	2019/1/8	EZPANFA2x4 / 40W / 4000K	C1
5	Goniophotometer Test	2019/1/8	EZPANFA2x4 / 40W / 4000K	C1
6	THD and PF Test	2019/1/8	EZPANFA2x4 / 40W / 4000K	C1
7	Integrating Sphere Test	2019/1/8	EZPANFA2x4 / 40W / 5000K	C1
8	Goniophotometer Test	2019/1/8	EZPANFA2x4 / 40W / 5000K	C1
9	THD and PF Test	2019/1/8	EZPANFA2x4 / 40W / 5000K	C1

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### 3.0 Production Description

**Luminaire Description:** EZPANFA2x4 / 40W / 3500K  
EZPANFA2x4 / 40W / 4000K  
EZPANFA2x4 / 40W / 5000K

**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.	EZPANFA2x4 / 40W / 3500K	Sample ID.	C1
Operate time (Min.)	90	Stabilization time (Min.)	45

#### 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 Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
24.5	276.99	60	0.153	40.5	0.953

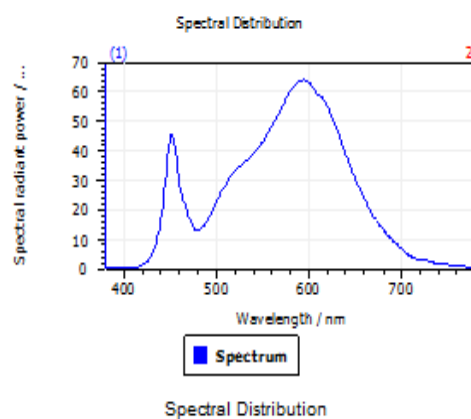
#### Test Result

CCT (K)	CRI (Ra)	Duv
3371	79	2.0E-03

## 4.1 Integrating Sphere Test

### Spectroradiometric Parameters

#### Results

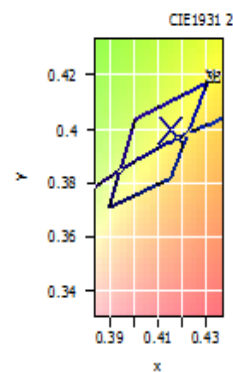


#### Spectral values

DominantWavelength	580.59 nm
Purity	0.446
PeakWavelength	593.97 nm
Width50%:	131.60 nm

#### Color Coordinates

Correlated Color Temperature			3371 K
x: 0.4150	u: 0.2382	u': 0.2382	
y: 0.4000	v: 0.3443	v': 0.5165	
CRI01	76.1	CRI09	
CRI02	87.9	CRI10	
CRI03	95.8	CRI11	
CRI04	75.8	CRI12	
CRI05	76.1	CRI13	
CRI06	83.9	CRI14	
CRI07	81.6	CRI15	
CRI08	53.6	CRI16	
ResultsCRI	78.9		



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## 4.0 LM-79 Measurement and Test Results

### 4.3 Goniophotometer Test

Model No.	EZPANFA2x4 / 40W / 3500K	Sample ID.	C1
Operate time (Min.)	90	Stabilization time (Min.)	45

#### Test Method

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

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

The ambient temperature shall be maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , 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  $\pm 0.2$  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  $0.5^{\circ}$  vertical intervals and  $10^{\circ}$  horizontal intervals.

#### Test Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.5	276.92	60	0.153	40.3	0.949	Light Down

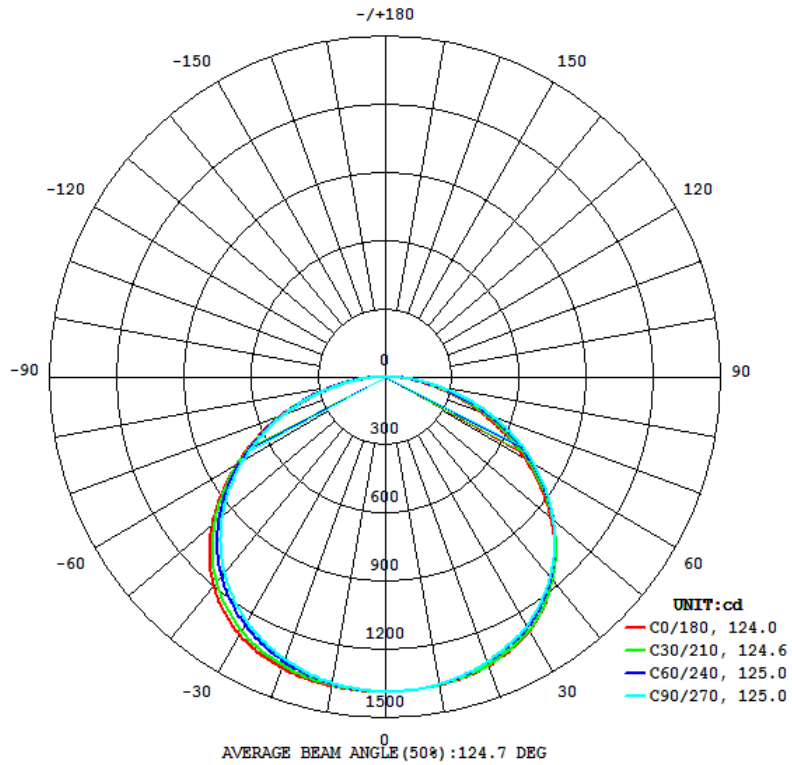
#### Test Result

Flux(lm)	Zonal Lumen Requirement ( $0^{\circ}$ - $60^{\circ}$ )	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
		Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	
4609	75.92%	166.8	167.3	124.0	125.0	114.4

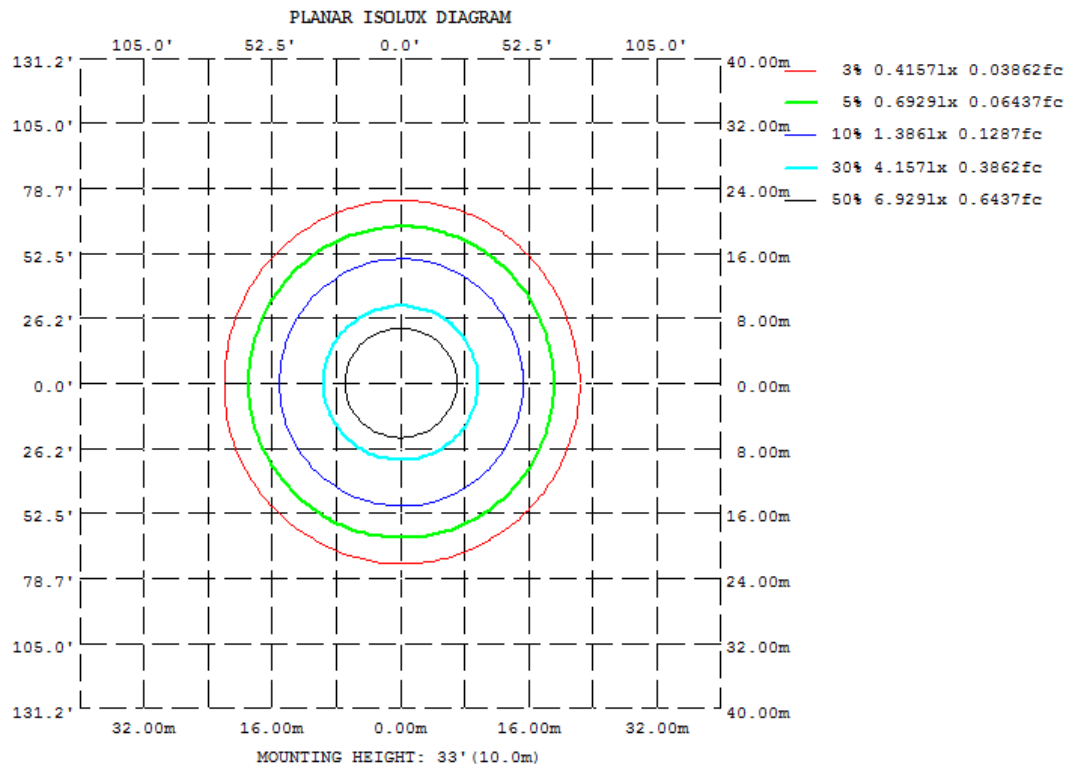
SC: $0^{\circ}$ - $180^{\circ}$	SC: $90^{\circ}$ - $270^{\circ}$
1.34	1.40

### 4.3 Goniophotometer Test

#### Light Distrubtion Curve



#### Isolux Plot





### 4.3 Goniophotometer Test

#### Zonal Lumen Summary

DEG	LUMINOUS INTENSITY:cd							
7	C0	C45	C90	C135	C180	C225	C270	C315
10	1381	1374	1368	1372	1377	1375	1373	1378
20	1361	1340	1322	1336	1350	1341	1332	1349
30	1308	1273	1242	1266	1289	1281	1265	1293
40	1196	1159	1121	1144	1165	1162	1149	1182
50	1011	986.6	952.4	963.0	969.5	983.6	984.4	1007
60	768.5	757.3	736.5	729.7	723.6	753.0	770.7	773.6
70	499.1	495.6	486.4	471.0	456.1	490.1	515.8	503.9
80	232.3	227.1	217.7	212.6	203.1	226.6	243.9	233.5
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

### 4.3 Goniophotometer Test

#### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	131.70	0 - 10	131.70	2.86%
10-20	385.08	0 - 20	516.78	11.21%
20-30	606.14	0 - 30	1122.92	24.36%
30-40	766.54	0 - 40	1889.46	41.00%
40-50	830.75	0 - 50	2720.21	59.02%
50-60	778.62	0 - 60	3498.83	75.92%
60-70	615.84	0 - 70	4114.67	89.28%
70-80	375.81	0 - 80	4490.48	97.43%
80-90	118.28	0 - 90	4608.76	100.00%
90-100	0.00	0 - 100	4608.76	100.00%
100-110	0.00	0 - 110	4608.76	100.00%
110-120	0.00	0 - 120	4608.76	100.00%
120-130	0.00	0 - 130	4608.76	100.00%
130-140	0.00	0 - 140	4608.76	100.00%
140-150	0.00	0 - 150	4608.76	100.00%
150-160	0.00	0 - 160	4608.76	100.00%
160-170	0.00	0 - 170	4608.76	100.00%
170-180	0.00	0 - 180	4608.76	100.00%

### 4.3 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
R/W	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	98	94	105	101	96	93	96	93	90	92	90	87	89	87	84	82
2	98	89	82	76	95	87	80	75	83	78	73	80	75	71	77	73	70	68
3	89	78	69	62	86	76	68	62	73	66	61	70	64	60	68	63	58	56
4	81	68	59	52	79	67	59	52	65	57	51	62	56	50	60	54	50	47
5	74	61	52	45	72	60	51	44	58	50	44	56	49	43	54	48	43	41
6	68	55	45	39	66	54	45	38	52	44	38	50	43	38	48	42	37	35
7	63	49	40	34	61	48	40	34	47	39	34	45	38	33	44	38	33	31
8	59	45	36	30	57	44	36	30	43	35	30	42	35	30	40	34	29	27
9	55	41	33	27	53	40	32	27	39	32	27	38	31	27	37	31	26	25
10	51	38	30	24	50	37	30	24	36	29	24	35	29	24	34	28	24	22

#### CONE OF LIGHT DIAGRAM



## 5.0 THD and PF Test

Model No.	EZPANFA2x4 / 40W / 3500K	Sample ID.	C1
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### 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

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD
24.5	276.99	60	0.153	40.5	0.953	7.30%
24.5	120.04	60	0.338	40.2	0.993	8.84%

## 4.0 LM-79 Measurement and Test Results

### 4.1 Integrating Sphere Test

Model No.	EZPANFA2x4 / 40W / 4000K	Sample ID.	C1
Operate time (Min.)	90	Stabilization time (Min.)	45

#### 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 Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
24.5	276.99	60	0.148	38.9	0.952

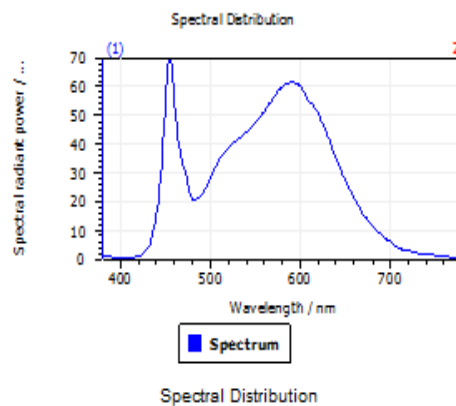
#### Test Result

CCT (K)	CRI (Ra)	Duv
4037	81	2.4E-03

## 4.1 Integrating Sphere Test

### Spectroradiometric Parameters

#### Results



#### Spectral values

DominantWavelength	577.66 nm
Purity	0.289
PeakWavelength	454.62 nm
Width50%	22.65 nm

#### Color Coordinates

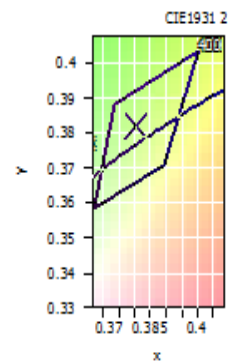
Correlated Color Temperatu 4037 K

x: 0.3805 u: 0.2231 u': 0.2231

y: 0.3821 v: 0.3359 v': 0.5039

CRI01	78.6	CRI09	-4.7
CRI02	90.3	CRI10	77.0
CRI03	95.0	CRI11	75.2
CRI04	76.6	CRI12	58.2
CRI05	78.5	CRI13	81.9
CRI06	86.2	CRI14	97.7
CRI07	82.7	CRI15	70.8
CRI08	58.1	CRI16	66.9

ResultsCRI 80.8



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## 4.0 LM-79 Measurement and Test Results

### 4.3 Goniophotometer Test

Model No.	EZPANFA2x4 / 40W / 4000K	Sample ID.	C1
Operate time (Min.)	90	Stabilization time (Min.)	45

#### Test Method

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

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

The ambient temperature shall be maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , 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  $\pm 0.2$  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  $0.5^{\circ}$  vertical intervals and  $10^{\circ}$  horizontal intervals.

#### Test Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.5	276.99	60	0.148	38.7	0.947	Light Down

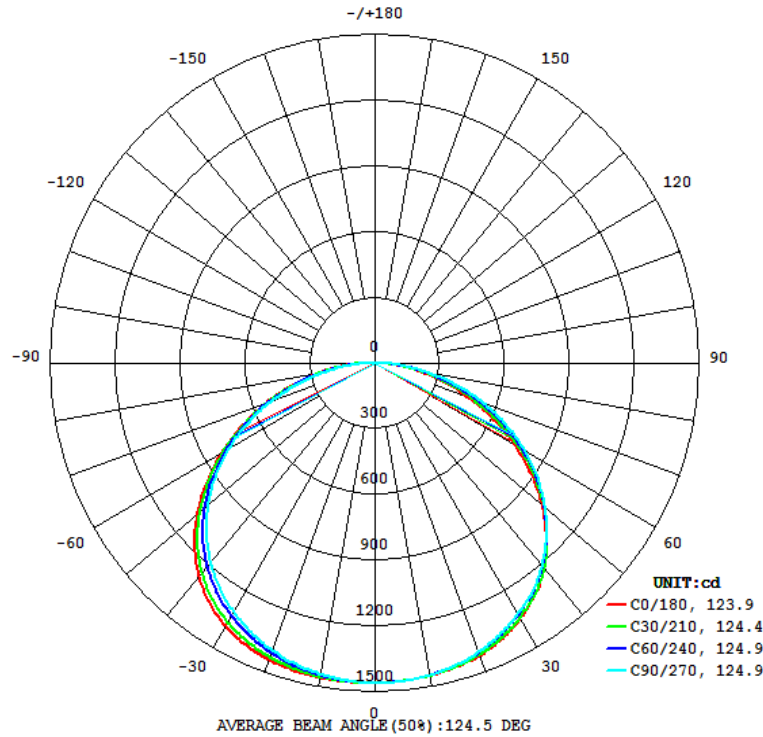
#### Test Result

Flux(lm)	Zonal Lumen Requirement ( $0^{\circ}$ - $60^{\circ}$ )	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
		Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	
4845	76.00%	166.7	167.1	123.8	124.8	125.2

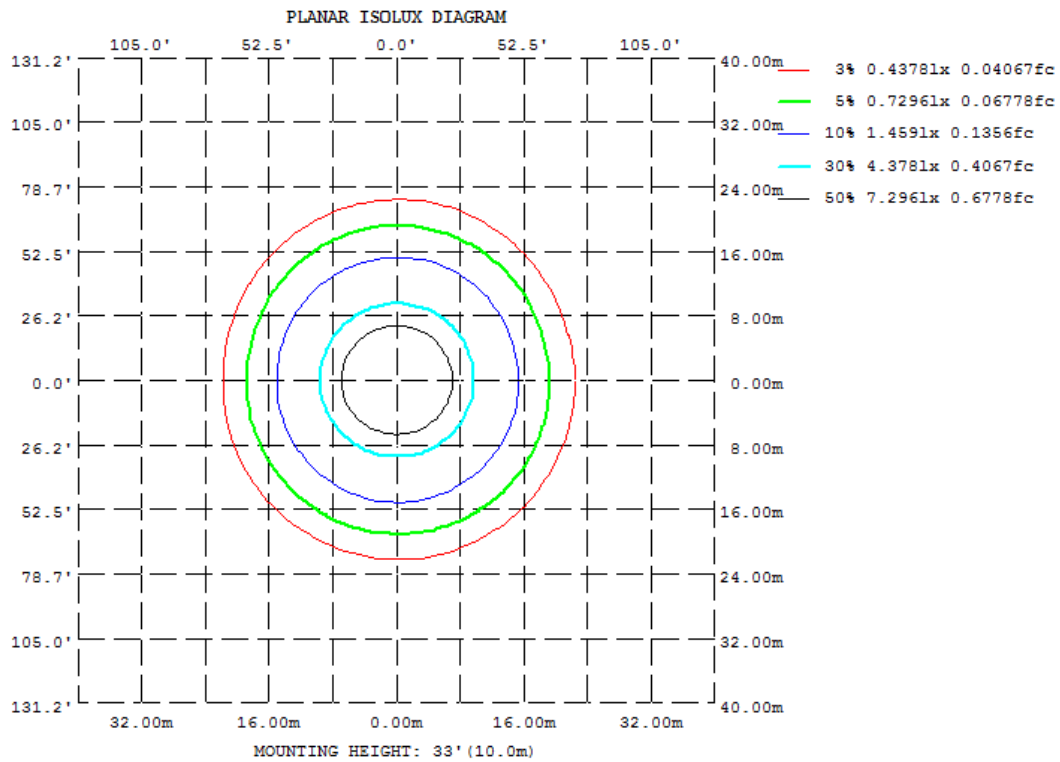
SC: $0^{\circ}$ - $180^{\circ}$	SC: $90^{\circ}$ - $270^{\circ}$
1.34	1.38

### 4.3 Goniophotometer Test

#### Light Distrubtion Curve



#### Isolux Plot





### 4.3 Goniophotometer Test

#### Zonal Lumen Summary

DEG	LUMINOUS INTENSITY:cd									
γ	C0	C45	C90	C135	C180	C225	C270	C315		
10	1458	1450	1442	1444	1448	1446	1446	1454		
20	1439	1417	1394	1406	1418	1408	1402	1424		
30	1384	1347	1310	1331	1347	1334	1322	1359		
40	1266	1227	1184	1204	1220	1216	1206	1247		
50	1073	1045	1007	1013	1012	1027	1031	1061		
60	819.1	804.9	780.2	768.1	748.9	780.8	803.3	812.9		
70	538.3	532.3	518.4	494.9	464.8	500.7	533.3	531.0		
80	260.1	250.9	232.0	219.8	197.0	221.3	245.4	247.8		
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		

### 4.3 Goniophotometer Test

#### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	138.78	0 - 10	138.78	2.86%
10-20	405.78	0 - 20	544.56	11.24%
20-30	638.15	0 - 30	1182.71	24.41%
30-40	806.21	0 - 40	1988.92	41.05%
40-50	874.44	0 - 50	2863.36	59.10%
50-60	818.92	0 - 60	3682.28	76.00%
60-70	646.43	0 - 70	4328.71	89.34%
70-80	393.48	0 - 80	4722.19	97.47%
80-90	122.78	0 - 90	4844.97	100.00%
90-100	0.00	0 - 100	4844.97	100.00%
100-110	0.00	0 - 110	4844.97	100.00%
110-120	0.00	0 - 120	4844.97	100.00%
120-130	0.00	0 - 130	4844.97	100.00%
130-140	0.00	0 - 140	4844.97	100.00%
140-150	0.00	0 - 150	4844.97	100.00%
150-160	0.00	0 - 160	4844.97	100.00%
160-170	0.00	0 - 170	4844.97	100.00%
170-180	0.00	0 - 180	4844.97	100.00%

### 4.3 Goniophotometer Test

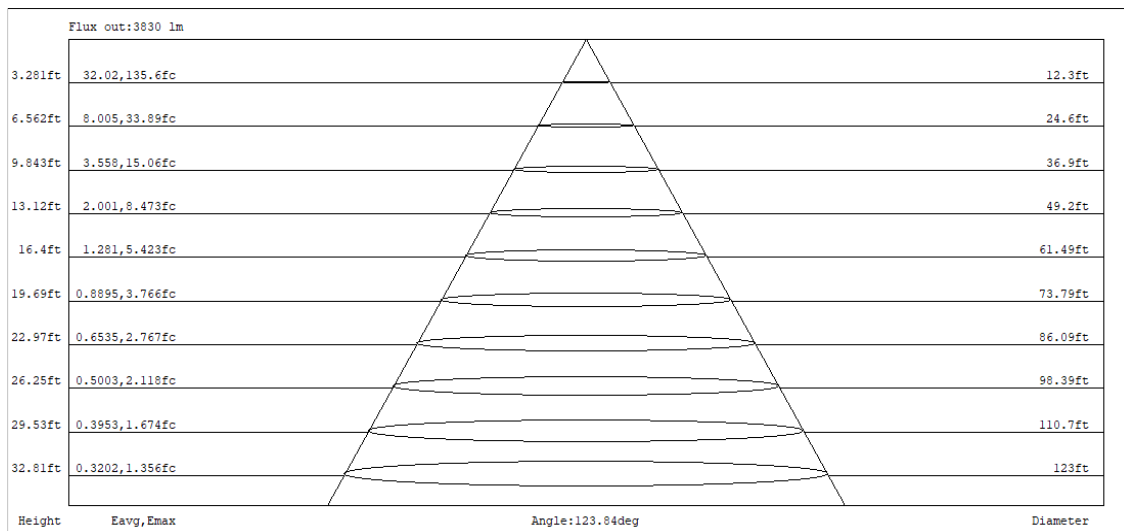
#### COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

##### Coefficients Of Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance 0.20

RC	80				70				50			30			10			0
R/W	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	98	94	105	101	97	93	96	93	90	92	90	87	89	87	84	82
2	98	89	82	76	95	87	81	75	84	78	73	80	76	71	77	73	70	68
3	89	78	69	62	86	76	68	62	73	66	61	70	64	60	68	63	59	56
4	81	68	59	52	79	67	59	52	65	57	51	62	56	50	60	54	50	48
5	74	61	52	45	72	60	51	44	58	50	44	56	49	43	54	48	43	41
6	68	55	45	39	66	54	45	39	52	44	38	50	43	38	48	42	37	35
7	63	49	40	34	62	49	40	34	47	39	34	45	39	33	44	38	33	31
8	59	45	36	30	57	44	36	30	43	35	30	42	35	30	40	34	29	27
9	55	41	33	27	53	41	32	27	39	32	27	38	31	27	37	31	26	25
10	51	38	30	24	50	37	30	24	36	29	24	35	29	24	34	28	24	22

#### CONE OF LIGHT DIAGRAM



## 5.0 THD and PF Test

Model No.	EZPANFA2x4 / 40W / 4000K	Sample ID.	C1
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### 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

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD
24.5	276.99	60	0.148	38.9	0.952	8.95%
24.5	120.05	60	0.325	38.6	0.993	8.51%

## 4.0 LM-79 Measurement and Test Results

### 4.1 Integrating Sphere Test

Model No.	EZPANFA2x4 / 40W / 5000K	Sample ID.	C1
Operate time (Min.)	90	Stabilization time (Min.)	45

#### 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 Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
24.6	277.04	60	0.152	40.20	0.953

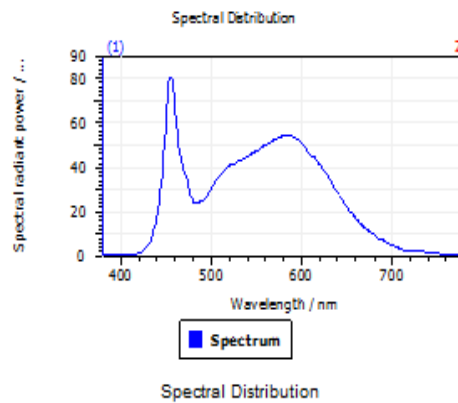
#### Test Result

CCT (K)	CRI (Ra)	Duv
4812	81	5.1E-03

## 4.1 Integrating Sphere Test

### Spectroradiometric Parameters

#### Results

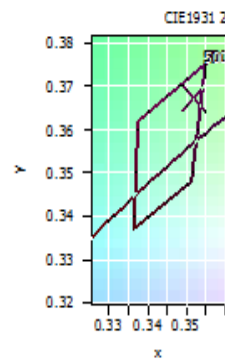


#### Spectral values

DominantWavelength	570.96 nm
Purity	0.160
PeakWavelength	455.05 nm
Width50%	22.62 nm

#### Color Coordinates

Correlated Color Temperatu			4812 K
x: 0.3520	u: 0.2100	u': 0.2100	
y: 0.3676	v: 0.3288	v': 0.4933	
CRI01	77.9	CRI09	
CRI02	89.6	CRI10	
CRI03	94.9	CRI11	
CRI04	75.4	CRI12	
CRI05	77.6	CRI13	
CRI06	84.7	CRI14	
CRI07	84.0	CRI15	
CRI08	60.1	CRI16	
ResultsCRI	80.5		



PlanckDistance 5.1E-003

## 4.0 LM-79 Measurement and Test Results

### 4.3 Goniophotometer Test

Model No.	EZPANFA2x4 / 40W / 5000K	Sample ID.	C1
Operate time (Min.)	90	Stabilization time (Min.)	45

#### Test Method

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

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

The ambient temperature shall be maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , 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  $\pm 0.2$  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  $0.5^{\circ}$  vertical intervals and  $10^{\circ}$  horizontal intervals.

#### Test Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.6	276.90	60	0.153	40.1	0.949	Light Down

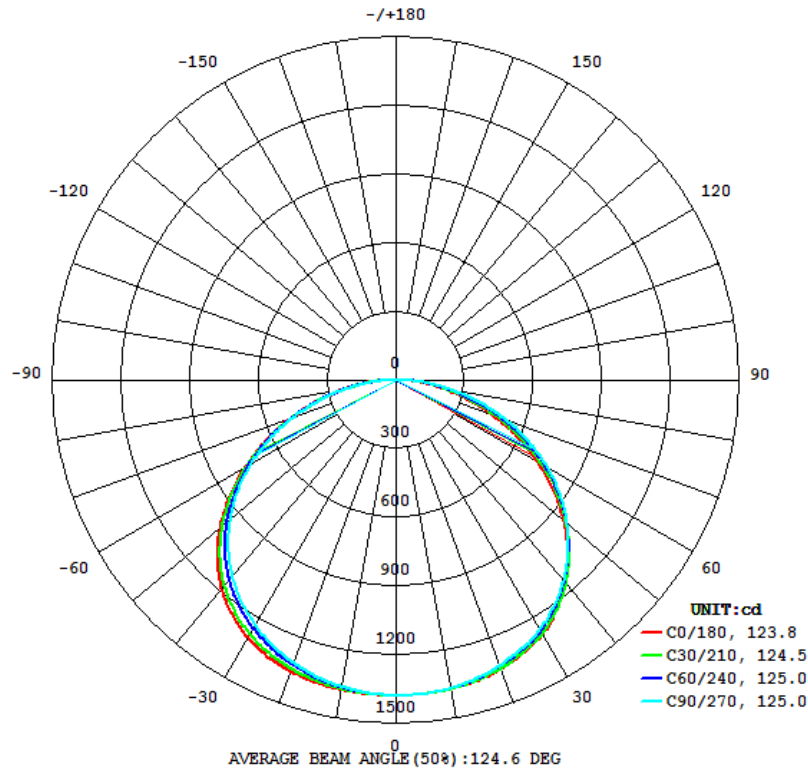
#### Test Result

Flux(lm)	Zonal Lumen Requirement ( $0^{\circ}$ - $60^{\circ}$ )	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
		Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	
4578	75.92%	166.8	167.2	123.8	125.0	114.2

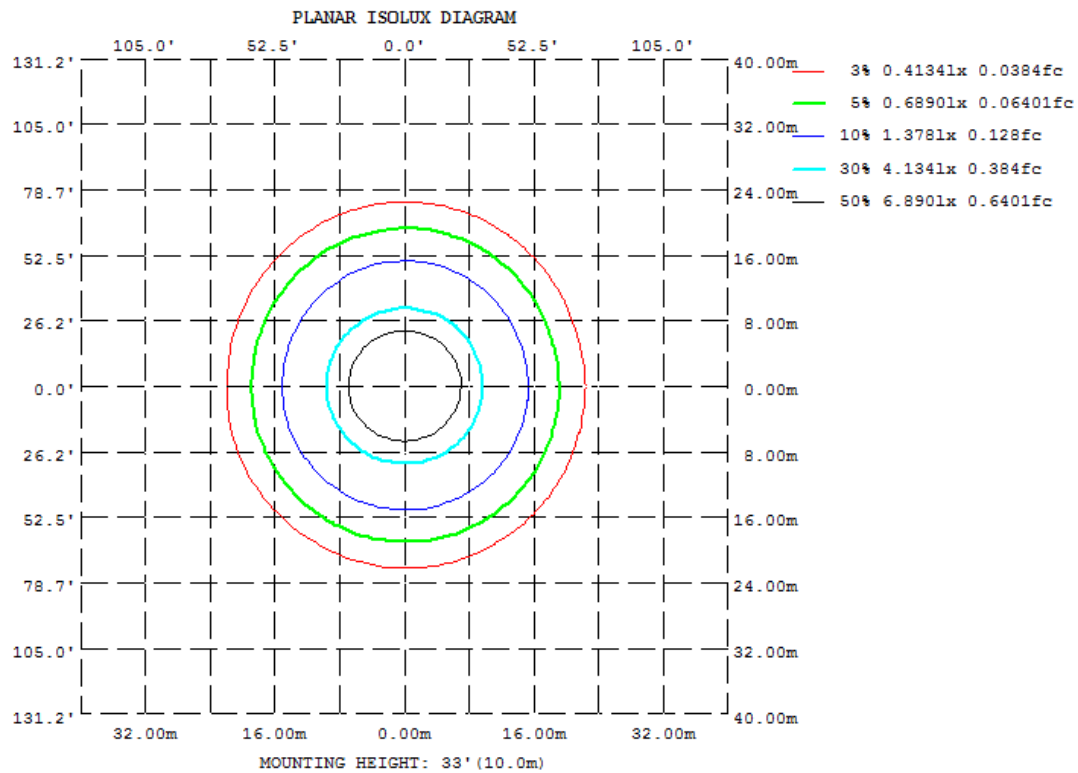
SC: $0^{\circ}$ - $180^{\circ}$	SC: $90^{\circ}$ - $270^{\circ}$
1.34	1.38

### 4.3 Goniophotometer Test

#### Light Distrubtion Curve



#### Isolux Plot





### 4.3 Goniophotometer Test

#### Zonal Lumen Summary

DEG	LUMINOUS INTENSITY:cd									
γ	C0	C45	C90	C135	C180	C225	C270	C315		
10	1373	1366	1361	1365	1369	1368	1366	1371		
20	1352	1332	1314	1328	1342	1334	1325	1341		
30	1298	1265	1234	1257	1283	1273	1258	1287		
40	1186	1151	1113	1135	1155	1155	1143	1174		
50	1003	979.2	946.0	955.1	960.7	977.3	979.0	999.2		
60	761.9	751.9	731.5	723.9	717.1	748.4	766.9	767.7		
70	495.1	491.7	483.0	467.6	452.0	486.9	513.0	500.1		
80	231.0	225.8	216.4	211.5	201.0	225.2	242.5	231.7		
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		

### 4.3 Goniophotometer Test

#### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	131.00	0 - 10	131.00	2.86%
10-20	382.90	0 - 20	513.90	11.23%
20-30	602.55	0 - 30	1116.45	24.39%
30-40	761.46	0 - 40	1877.91	41.02%
40-50	824.80	0 - 50	2702.71	59.04%
50-60	772.92	0 - 60	3475.63	75.92%
60-70	611.57	0 - 70	4087.20	89.28%
70-80	373.23	0 - 80	4460.43	97.43%
80-90	117.54	0 - 90	4577.97	100.00%
90-100	0.00	0 - 100	4577.97	100.00%
100-110	0.00	0 - 110	4577.97	100.00%
110-120	0.00	0 - 120	4577.97	100.00%
120-130	0.00	0 - 130	4577.97	100.00%
130-140	0.00	0 - 140	4577.97	100.00%
140-150	0.00	0 - 150	4577.97	100.00%
150-160	0.00	0 - 160	4577.97	100.00%
160-170	0.00	0 - 170	4577.97	100.00%
170-180	0.00	0 - 180	4577.97	100.00%

### 4.3 Goniophotometer Test

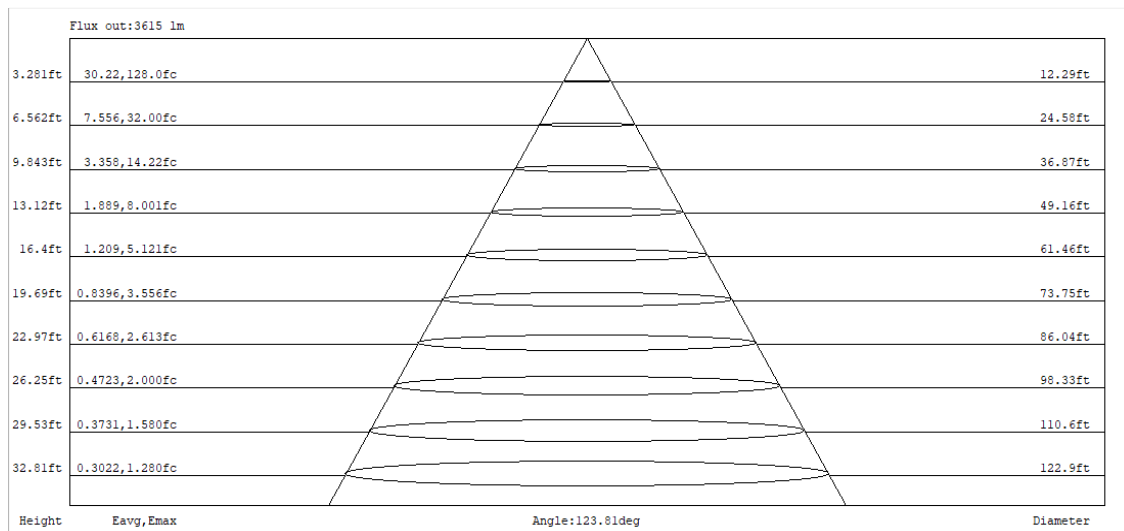
#### COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

##### Coefficients Of Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance 0.20

RC	80				70				50			30			10			0
R/W	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	98	94	105	101	96	93	96	93	90	92	90	87	89	87	84	82
2	98	89	82	76	95	87	80	75	84	78	73	80	76	71	77	73	70	68
3	89	78	69	62	86	76	68	62	73	66	61	70	64	60	68	63	58	56
4	81	68	59	52	79	67	59	52	65	57	51	62	56	50	60	54	50	47
5	74	61	52	45	72	60	51	44	58	50	44	56	49	43	54	48	43	41
6	68	55	45	39	66	54	45	39	52	44	38	50	43	38	48	42	37	35
7	63	49	40	34	61	49	40	34	47	39	34	45	38	33	44	38	33	31
8	59	45	36	30	57	44	36	30	43	35	30	42	35	30	40	34	29	27
9	55	41	33	27	53	40	32	27	39	32	27	38	31	27	37	31	26	25
10	51	38	30	24	50	37	30	24	36	29	24	35	29	24	34	28	24	22

#### CONE OF LIGHT DIAGRAM



## 5.0 THD and PF Test

Model No.	EZPANFA2x4 / 40W / 5000K	Sample ID.	C1
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### 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

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD
24.6	277.04	60	0.152	40.2	0.953	7.71%
24.6	120.01	60	0.336	40.0	0.993	8.74%

## 6.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
DLF107	Integrating Sphere System	2018/12/26	2019/12/25
DLF108	Auxiliary Lamp	2018/12/26	2019/12/25
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-derectional	2018/12/26	2019/12/25
DLF116	AC Power Source	2018/12/26	2019/12/25
DLF113	Power Meter	2018/12/26	2019/12/25
DLF112	Temperature Recorder	2018/12/26	2019/12/25
DLF114	Temperature & Humidity Datalogger	2018/12/26	2019/12/25
DLF101	Goniophotometer	2018/12/26	2019/12/25
DLF125	Standard Lamp Standard Lamp Type: 76.58 V, 6.7875 A, Tungsten, Omni-derectional	2018/12/26	2019/12/25
DLF104	AC Power Source	2018/12/26	2019/12/25
DLF507	DC Power Source	2018/12/26	2019/12/25
DLF102	Power Meter	2018/12/26	2019/12/25
DLF111	Temperature & Humidity Datalogger	2018/12/26	2019/12/25
DLF119	Power Meter	2018/12/26	2019/12/25
DLF031	Temperature data logger	2018/12/26	2019/12/25
DLF022	Digital power meter	2018/12/26	2019/12/25
DLF003	Temperature & Humidity Datalogger	2018/12/26	2019/12/25

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