

# Photometric Test Report

## Relevant Standards

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

## Prepared For

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## Project Number

**DLF2211103**

## Report Number

**DLF2211103-7a**

## Test Date

**2022/11/16**

## Issue Date

**2022/11/17**

## 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		3675
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 110	Premium 125	122.1
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		30.1
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	6.40%
		20.00%	277V	7.16%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.994
		0.9	277V	0.981
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	3465±245	3464
		4 step	3465±124	
Minimum CRI (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥80		83
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		97
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%		77.44%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<22		20.9
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	Worst Case		277
(Goniophotometer - Section 4.2)		Non-Worst Case		120
Input Current (A)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		0.111
(Goniophotometer - Section 4.2)		Non-Worst Case		0.252
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		30.1
(Goniophotometer - Section 4.2)		Non-Worst Case		30.0

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2022/11/16	T34FAHE2X2/30W/3500K	G1
2	Goniophotometer Test	2022/11/16	T34FAHE2X2/30W/3500K	G1
3	THD and PF Test	2022/11/16	T34FAHE2X2/30W/3500K	G1

### Remark(If any)

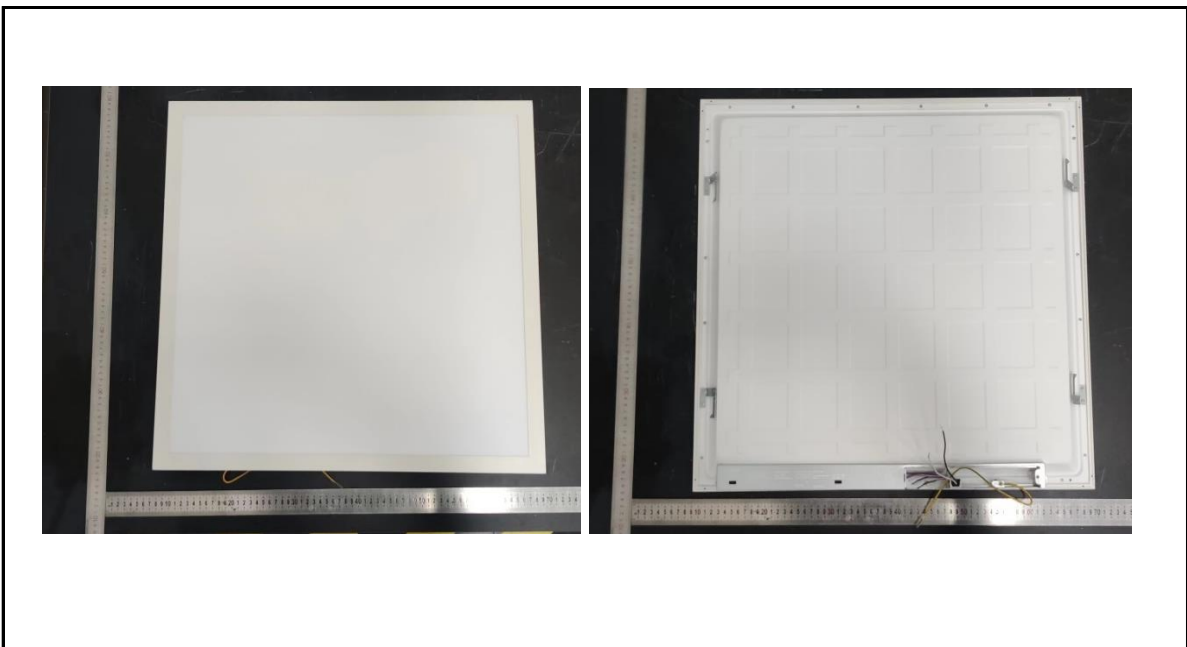
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## 3.0 Production Description

**Luminaire Description:** T34FAHE2X2/30W/3500K

**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.	T34FAHE2X2/30W/350 0K	Sample ID.	G1
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
120.02	60	0.248	29.6	0.994
276.98	60	0.109	29.7	0.981

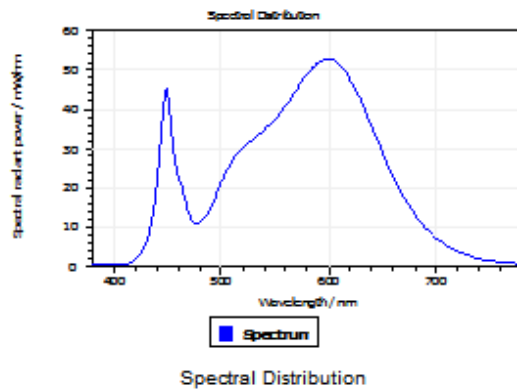
#### Test Result

CCT (K)	CRI	R9	Duv
3464	83	8	0.00024

Rf	Rg	IES Rcs,h1
85	97	-12%

## 4.1 Integrating Sphere Test

### Results



### Spectral values

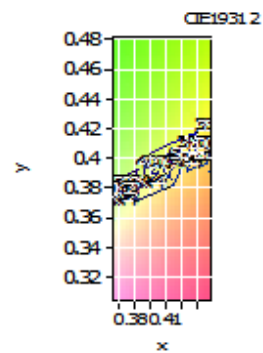
DominantWavelength 580.91 nm  
Purity 0.401  
PeakWavelength 598.89 nm  
Radiant Power 8.552 W  
Width50%:

### Color Coordinates

Correlated Color Temperat 3484 K  
x: 0.4076 u: 0.2365 u': 0.2365  
y: 0.3924 v: 0.3415 v': 0.5123

CRI01	80.9	CRI09	7.5
CRI02	89.3	CRI10	75.5
CRI03	95.9	CRI11	81.4
CRI04	81.9	CRI12	66.8
CRI05	81.3	CRI13	82.8
CRI06	86.3	CRI14	97.9
CRI07	84.6	CRI15	73.8
CRI08	61.9	CRI16	72.0

ResultsCRI 82.8



PlankDistance 2.4E-004

## 4.1 Integrating Sphere Test

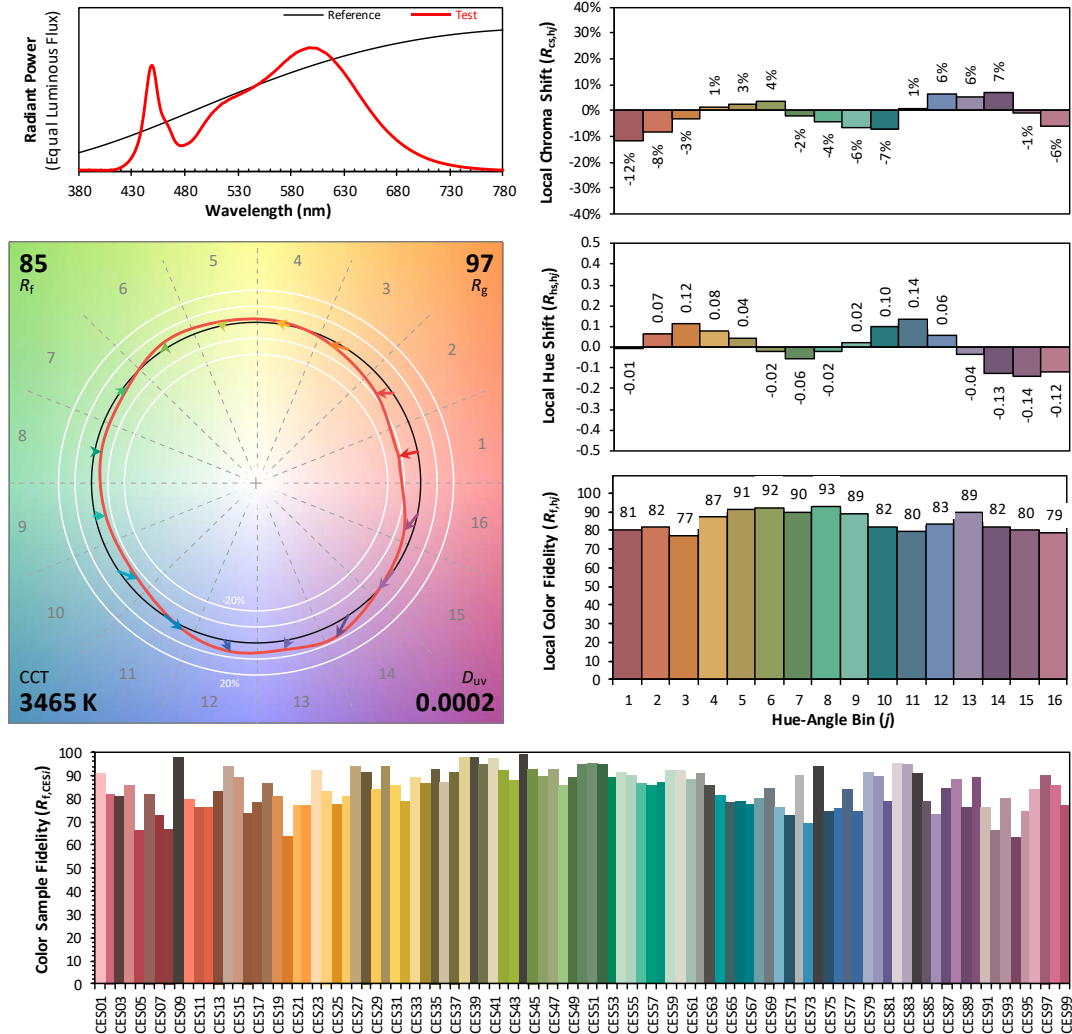
### IES TM-30-18 Color Rendition Report

Source: DLF2211103-7a

Manufacturer: RAB Lighting Inc.

Date: 2022/11/16

Model: T34FAHE2X2/30W/3500K



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

$x$  0.4076  
 $y$  0.3924  
 $u'$  0.2365  
 $v'$  0.5123

CIE 13.3-1995  
(CRI)

$R_a$  84  
 $R_g$  13

## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

Model No.	T34FAHE2X2/30W/3 500K	Sample ID.	G1
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	0.111	30.1	0.979
NON-WROST CASE	120.00	60	0.252	30.0	0.992

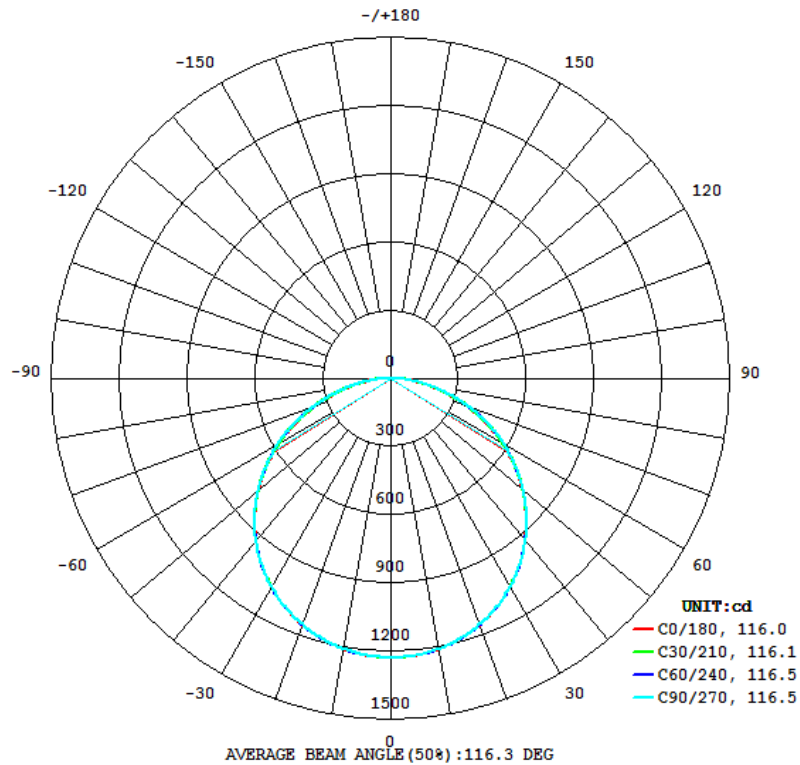
#### Test Result

Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
3675	163.7	164.5	116.0	116.5	122.1

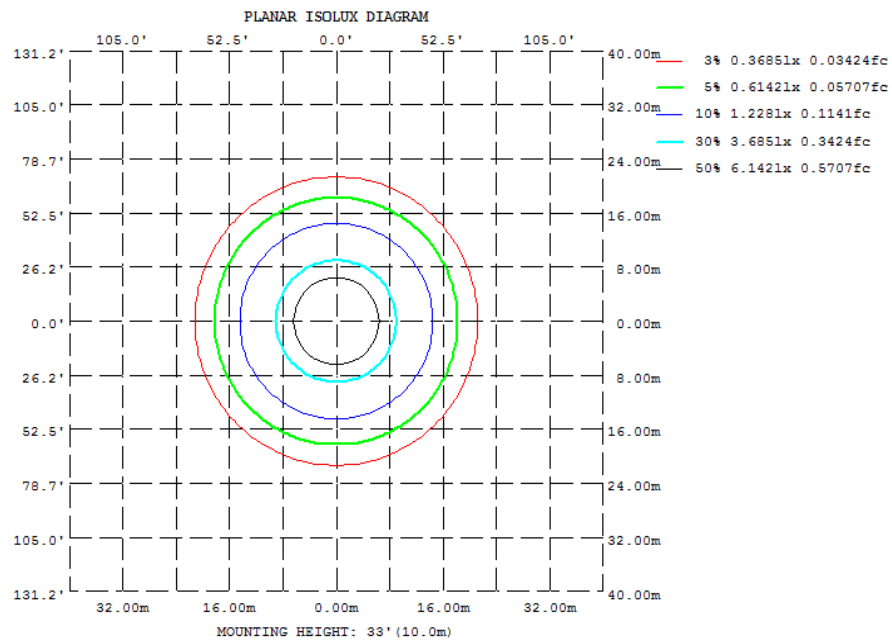
Zonal Lumen Requirement (0°-60°)	UGR (X=4H, Y=8H, 70/50/20%)	SC: 0-180°	SC: 90-270°
77.44%	20.9	1.28	1.28

## 4.2 Goniophotometer Test

### Light Distrubtion Curve



### Isolux Plot





## 4.2 Goniophotometer Test

### Zonal Lumen Summary

γ	C0	C45	C90	C135	C180	C225	C270	C315
10	1209	1207	1208	1207	1209	1207	1208	1207
20	1152	1151	1150	1151	1152	1151	1150	1151
30	1057	1057	1057	1057	1057	1057	1057	1057
40	927.3	928.2	929.2	928.2	927.3	928.2	929.2	928.2
50	765.0	766.9	768.8	766.9	765.0	766.9	768.8	766.9
60	573.6	576.7	579.4	576.7	573.6	576.7	579.4	576.7
70	362.3	368.9	373.3	368.9	362.3	368.9	373.3	368.9
80	157.1	164.4	167.2	164.4	157.1	164.4	167.2	164.4
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	16.3	18.0	16.7	18.3	18.6	16.3	17.9	16.6	18.3	18.6
	3H	18.2	19.8	18.6	20.1	20.4	18.1	19.7	18.5	20.0	20.3
	4H	19.0	20.4	19.4	20.8	21.1	18.8	20.3	19.2	20.6	21.0
	6H	19.5	20.9	19.9	21.2	21.6	19.4	20.7	19.8	21.1	21.4
	8H	19.7	21.0	20.2	21.4	21.8	19.5	20.8	20.0	21.2	21.6
	12H	19.9	21.1	20.3	21.5	21.9	19.7	20.9	20.1	21.3	21.7
4H	2H	17.0	18.4	17.4	18.8	19.1	16.9	18.4	17.3	18.7	19.1
	3H	19.1	20.3	19.5	20.7	21.1	19.0	20.2	19.4	20.6	21.0
	4H	20.0	21.1	20.4	21.5	21.9	19.9	21.0	20.3	21.4	21.8
	6H	20.7	21.7	21.2	22.1	22.6	20.5	21.5	21.0	21.9	22.4
	8H	20.9	21.8	21.4	22.3	22.7	20.8	21.7	21.2	22.1	22.6
	12H	21.1	21.9	21.6	22.4	22.9	20.9	21.7	21.4	22.2	22.7
8H	4H	20.3	21.2	20.8	21.7	22.1	20.2	21.1	20.7	21.6	22.0
	6H	21.2	21.9	21.7	22.4	22.9	21.0	21.8	21.5	22.3	22.7
	8H	21.5	22.2	22.0	22.7	23.2	21.3	22.0	21.8	22.5	23.0
	12H	21.8	22.4	22.3	22.8	23.4	21.6	22.2	22.1	22.7	23.2
12H	4H	20.4	21.2	20.9	21.7	22.1	20.3	21.1	20.7	21.5	22.0
	6H	21.3	21.9	21.8	22.4	22.9	21.1	21.8	21.6	22.2	22.8
	8H	21.6	22.2	22.1	22.7	23.3	21.5	22.1	22.0	22.5	23.1

Maximum UGR = 23.4

## 4.2 Goniophotometer Test

### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	116.25	0 - 10	116.25	3.16%
10-20	334.45	0 - 20	450.70	12.27%
20-30	511.32	0 - 30	962.02	26.18%
30-40	624.01	0 - 40	1586.03	43.16%
40-50	656.77	0 - 50	2242.80	61.03%
50-60	602.83	0 - 60	2845.63	77.44%
60-70	468.50	0 - 70	3314.13	90.19%
70-80	278.70	0 - 80	3592.83	97.77%
80-90	81.83	0 - 90	3674.66	100.00%
90-100	0.00	0 - 100	3674.66	100.00%
100-110	0.00	0 - 110	3674.66	100.00%
110-120	0.00	0 - 120	3674.66	100.00%
120-130	0.00	0 - 130	3674.66	100.00%
130-140	0.00	0 - 140	3674.66	100.00%
140-150	0.00	0 - 150	3674.66	100.00%
150-160	0.00	0 - 160	3674.66	100.00%
160-170	0.00	0 - 170	3674.66	100.00%
170-180	0.00	0 - 180	3674.66	100.00%

## 4.2 Goniophotometer Test

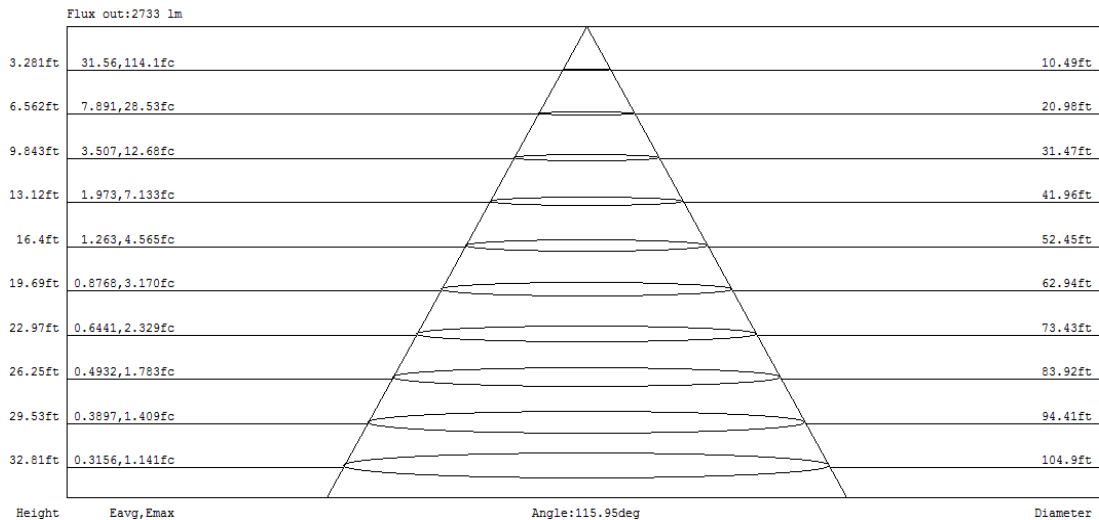
### COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

#### Coefficients Of Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance 0.20

RC	80				70				50			30			10			0
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	99	95	106	101	97	93	97	94	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	69
3	89	79	70	64	87	77	69	63	74	67	62	71	66	61	69	64	60	57
4	82	69	60	54	79	68	60	53	66	58	52	63	57	52	61	56	51	49
5	75	62	53	46	73	61	52	46	59	51	45	57	50	45	55	49	44	42
6	69	56	47	40	67	55	46	40	53	45	39	51	44	39	50	44	39	37
7	64	50	42	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	42	34	28	40	33	28	39	33	28	38	32	28	26
10	52	39	31	26	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.	T34FAHE2X2/30W/3 500K	Sample ID.	G1
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
120.02	60	0.248	29.6	0.994	6.40%
276.98	60	0.109	29.7	0.981	7.16%

## 5.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
DLF107	Integrating Sphere System	2021/12/26	2022/12/25
DLF108	Auxiliary Lamp	2021/12/26	2022/12/25
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-derectional	2021/12/26	2022/12/25
DLF116	AC Power Source	2021/12/26	2022/12/25
DLF113	Power Meter	2021/12/26	2022/12/25
DLF112	Temperature Recorder	2021/12/26	2022/12/25
DLF114	Temperature & Humidity Datalogger	2021/12/26	2022/12/25
DLF101	Goniophotometer	2021/12/26	2022/12/25
DLF125	Standard Lamp Standard Lamp Type: 76.58 V, 6.7875 A, Tungsten, Omni-derectional	2021/12/26	2022/12/25
DLF104	AC Power Source	2021/12/26	2022/12/25
DLF507	DC Power Source	2021/12/26	2022/12/25
DLF102	Power Meter	2021/12/26	2022/12/25
DLF111	Temperature & Humidity Datalogger	2021/12/26	2022/12/25
DLF119	Power Meter	2021/12/26	2022/12/25
DLF031	Temperature data logger	2021/12/26	2022/12/25
DLF022	Digital power meter	2021/12/26	2022/12/25
DLF003	Temperature & Humidity Datalogger	2021/12/26	2022/12/25

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