

# Photometric Test Report

## Relevant Standards

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

## Prepared For

**RAB Lighting Inc.**

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## Project Number

**DLF2211103**

## Report Number

**DLF2211103-11a**

## Test Date

**2022/11/16**

## Issue Date

**2022/11/17**

## Prepared By



Wangzun Zhu

## Approved By



Kevin Jia

The results contained in this report pertain only to the tested sample.

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## 1.0 Test Summary

DLC Technical Requirements v5.1

Indoor - Troffer - 2x4 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	3000		2391
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 110	Premium 125	135.9
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		17.6
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	7.20%
		20.00%	277V	7.46%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.993
		0.9	277V	0.913
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	3985±275	4065
		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		15
Minimum Rf (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥70		84
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%		-11%
Zonal Lumen Requirement (0°-60°) (Goniophotometer - Section 4.2)	IES LM-79-2008	≥75%		76.49%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<22		17.6
SC: 0-180° (Goniophotometer - Section 4.2)	IES LM-79-2008	1.0-2.0		1.34
SC: 90-270° (Goniophotometer - Section 4.2)	IES LM-79-2008	1.0-2.0		1.30
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		0.070
(Goniophotometer - Section 4.2)		Non-Worst Case		0.140
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		17.6
(Goniophotometer - Section 4.2)		Non-Worst Case		16.6

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2022/11/16	T34FAHE2X4/17W/4000K	K1
2	Goniophotometer Test	2022/11/16	T34FAHE2X4/17W/4000K	K1
3	THD and PF Test	2022/11/16	T34FAHE2X4/17W/4000K	K1

### Remark(If any)

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- 2、 The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products. This report does not imply that the product(s) has met the criteria for certification.

## 3.0 Production Description

**Luminaire Description:** T34FAHE2X4/17W/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.	T34FAHE2X4/17W/400 0K	Sample ID.	K1
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
119.99	60	0.138	16.4	0.993
277.00	60	0.069	17.4	0.913

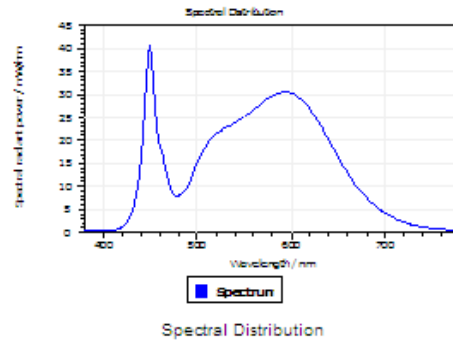
#### Test Result

CCT (K)	CRI	R9	Duv
4065	84	15	0.00072

Rf	Rg	IES Rcs,h1
84	97	-11%

## 4.1 Integrating Sphere Test

### Results



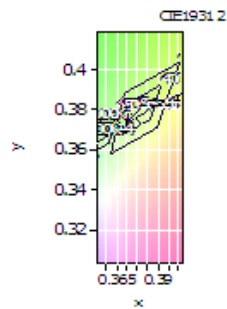
#### Spectral values

DominantWavelength 578.42 nm  
Purity 0.266  
PeakWavelength 449.45 nm  
Radiant Power 5.491 W  
Width50%:

#### Color Coordinates

Correlated Color Temperat 4065 K  
x: 0.3781 u: 0.2235 u': 0.2235  
y: 0.3768 v: 0.3342 v': 0.5013

CRI01	82.1	CRI09	14.5
CRI02	88.2	CRI10	72.0
CRI03	93.1	CRI11	83.3
CRI04	84.1	CRI12	59.6
CRI05	82.3	CRI13	83.3
CRI06	83.6	CRI14	96.1
CRI07	87.5	CRI15	76.4
CRI08	67.9	CRI16	74.7
ResultsCRI	83.6		



PlanckDistance 7.2E-004

## 4.1 Integrating Sphere Test

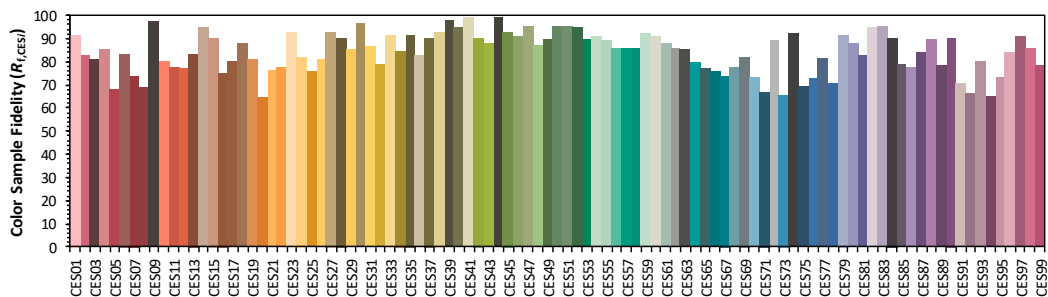
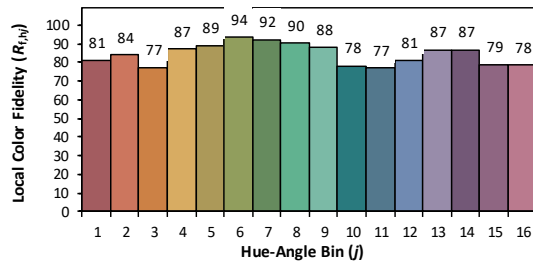
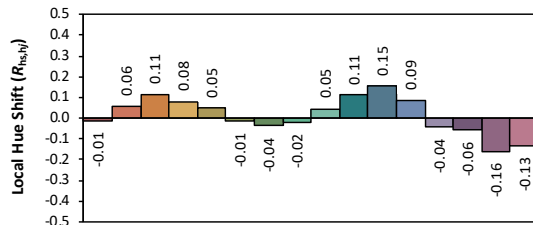
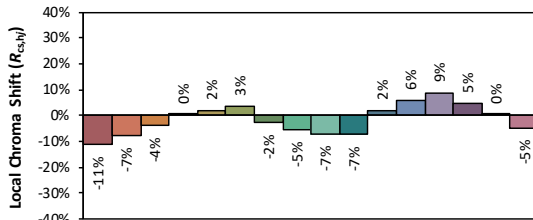
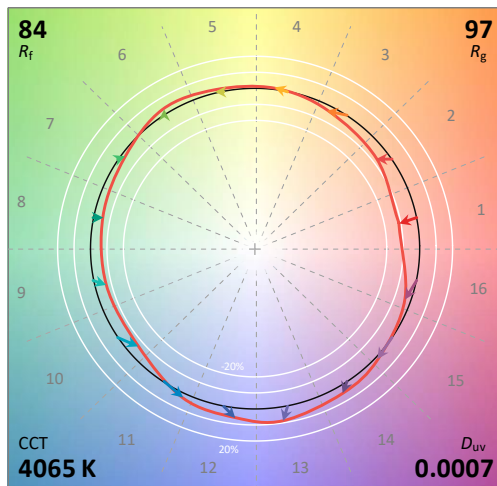
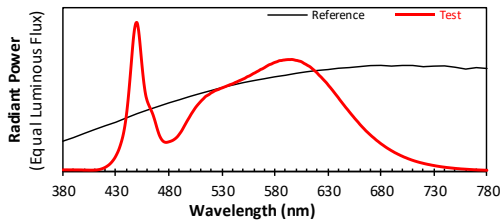
### IES TM-30-18 Color Rendition Report

Source: DLF2211103-11a

Manufacturer: RAB Lighting Inc.

Date: 2022/11/16

Model: T34FAHE2X4/17W/4000K



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

$x$  0.3781  
 $y$  0.3768  
 $u'$  0.2235  
 $v'$  0.5012

CIE 13.3-1995  
(CRI)

$R_a$  84  
 $R_g$  18

## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

Model No.	T34FAHE2X4/17W/4 000K	Sample ID.	K1
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	276.93	60	0.070	17.6	0.907
NON-WROST CASE	119.97	60	0.140	16.6	0.987

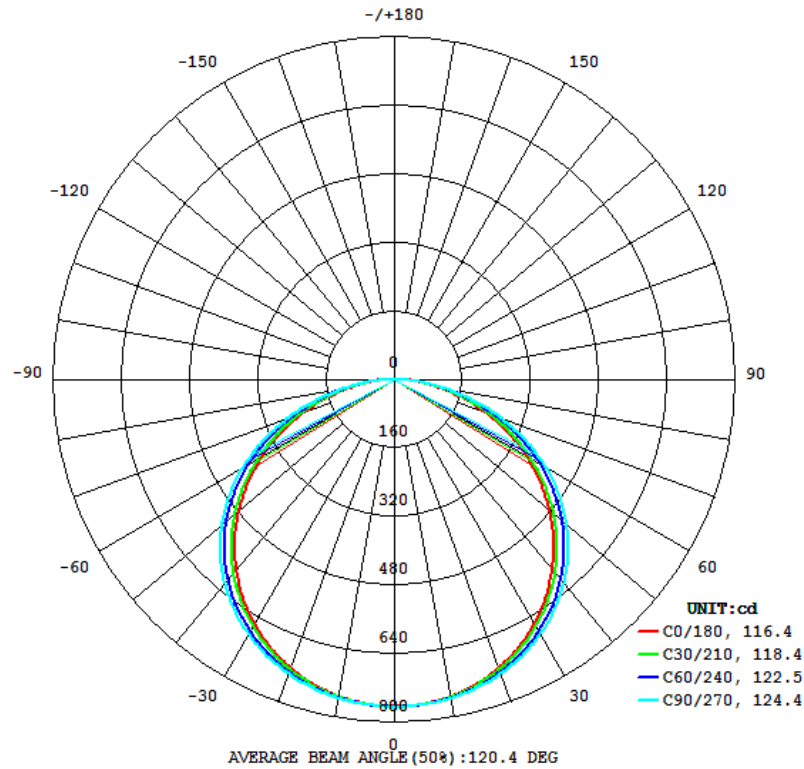
#### Test Result

Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
2391	164.8	166.0	116.4	124.4	135.9

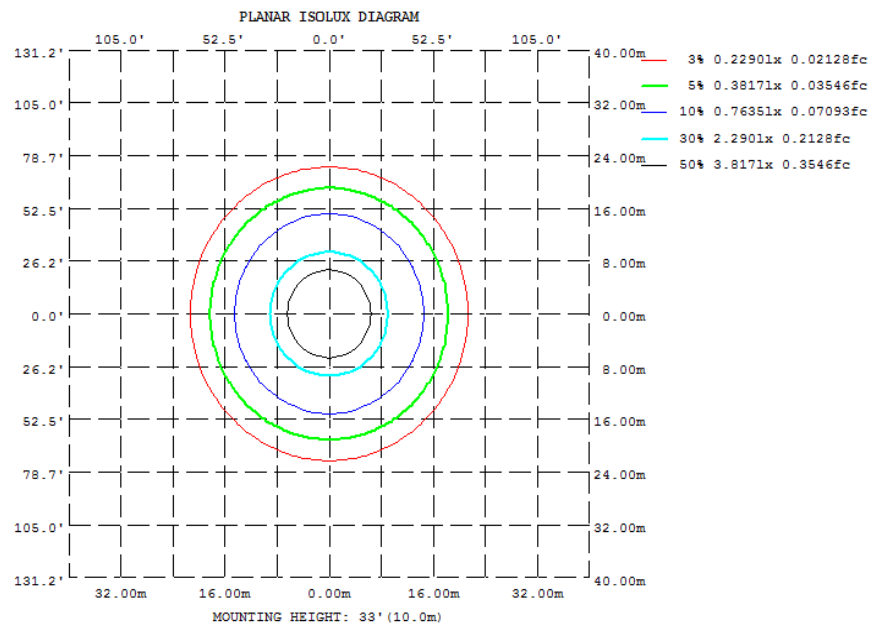
Zonal Lumen Requirement (0°-60°)	UGR (X=4H, Y=8H, 70/50/20%)	SC: 0-180°	SC: 90-270°
76.49%	17.6	1.34	1.30

## 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	751.5	752.8	755.5	752.8	751.5	752.8	755.5	752.8
20	716.0	722.8	729.9	722.8	716.0	722.8	729.9	722.8
30	657.8	671.2	685.8	671.2	657.8	671.2	685.8	671.2
40	578.0	597.6	619.5	597.6	578.0	597.6	619.5	597.6
50	477.8	502.0	528.8	502.0	477.8	502.0	528.8	502.0
60	359.9	384.2	411.2	384.2	359.9	384.2	411.2	384.2
70	231.2	249.5	269.6	249.5	231.2	249.5	269.6	249.5
80	104.4	112.4	118.7	112.4	104.4	112.4	118.7	112.4
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	12.9	14.5	13.2	14.9	15.2	12.2	13.9	12.5	14.2	14.5
	3H	14.9	16.4	15.2	16.7	17.1	14.1	15.6	14.4	15.9	16.3
	4H	15.6	17.1	16.0	17.4	17.8	14.8	16.2	15.2	16.6	17.0
	6H	16.2	17.6	16.6	17.9	18.3	15.4	16.7	15.8	17.1	17.5
	8H	16.4	17.7	16.8	18.1	18.5	15.5	16.8	16.0	17.2	17.6
	12H	16.5	17.8	17.0	18.1	18.6	15.7	16.9	16.1	17.3	17.7
4H	2H	13.5	14.9	13.9	15.3	15.6	12.9	14.4	13.3	14.7	15.1
	3H	15.7	16.9	16.1	17.3	17.7	15.1	16.3	15.5	16.7	17.1
	4H	16.6	17.7	17.1	18.1	18.6	15.9	17.0	16.3	17.4	17.8
	6H	17.3	18.3	17.8	18.7	19.2	16.6	17.6	17.0	18.0	18.5
	8H	17.6	18.5	18.1	18.9	19.4	16.9	17.7	17.3	18.2	18.7
	12H	17.8	18.6	18.2	19.1	19.5	17.0	17.8	17.5	18.3	18.8
8H	4H	16.9	17.8	17.4	18.3	18.7	16.3	17.2	16.8	17.7	18.1
	6H	17.8	18.5	18.3	19.0	19.5	17.1	17.9	17.6	18.4	18.9
	8H	18.1	18.8	18.6	19.3	19.8	17.5	18.1	18.0	18.6	19.1
	12H	18.4	19.0	18.9	19.5	20.0	17.7	18.3	18.2	18.8	19.4
12H	4H	17.0	17.8	17.5	18.3	18.7	16.4	17.2	16.8	17.7	18.1
	6H	17.9	18.5	18.4	19.0	19.5	17.2	17.9	17.8	18.4	18.9
	8H	18.2	18.8	18.7	19.3	19.9	17.6	18.2	18.1	18.7	19.3

Maximum UGR = 20.0

## 4.2 Goniophotometer Test

### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	72.37	0 - 10	72.37	3.03%
10-20	209.22	0 - 20	281.59	11.78%
20-30	322.78	0 - 30	604.37	25.28%
30-40	399.10	0 - 40	1003.47	41.97%
40-50	426.71	0 - 50	1430.18	59.82%
50-60	398.63	0 - 60	1828.81	76.49%
60-70	315.29	0 - 70	2144.10	89.68%
70-80	190.32	0 - 80	2334.42	97.64%
80-90	56.43	0 - 90	2390.85	100.00%
90-100	0.00	0 - 100	2390.85	100.00%
100-110	0.00	0 - 110	2390.85	100.00%
110-120	0.00	0 - 120	2390.85	100.00%
120-130	0.00	0 - 130	2390.85	100.00%
130-140	0.00	0 - 140	2390.85	100.00%
140-150	0.00	0 - 150	2390.85	100.00%
150-160	0.00	0 - 160	2390.85	100.00%
160-170	0.00	0 - 170	2390.85	100.00%
170-180	0.00	0 - 180	2390.85	100.00%

## 4.2 Goniophotometer Test

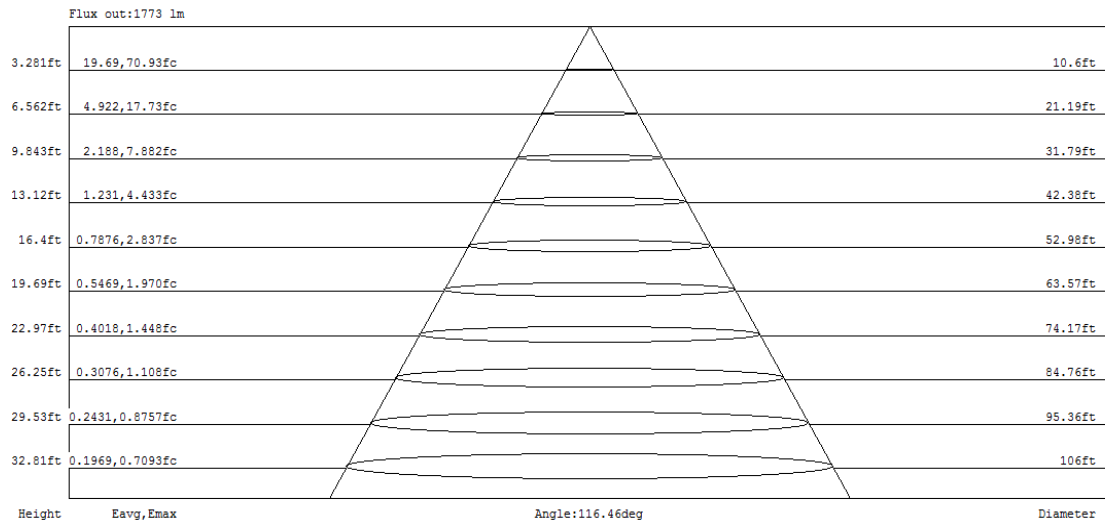
### COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

#### 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	105	101	97	93	97	93	90	93	90	87	89	87	85	83
2	98	89	82	76	95	87	81	75	84	78	74	81	76	72	77	74	70	68
3	89	78	70	63	86	76	69	62	73	67	61	71	65	60	68	63	59	57
4	81	69	60	53	79	68	59	52	65	58	52	63	56	51	60	55	50	48
5	75	61	52	45	72	60	51	45	58	50	44	56	49	44	54	48	43	41
6	69	55	46	39	67	54	45	39	52	45	39	51	44	38	49	43	38	36
7	64	50	41	35	62	49	40	34	47	40	34	46	39	34	45	38	34	32
8	59	45	37	31	58	45	36	31	43	36	30	42	35	30	41	35	30	28
9	55	42	33	28	54	41	33	27	40	32	27	39	32	27	38	32	27	25
10	52	38	30	25	50	38	30	25	37	30	25	36	29	25	35	29	24	23

### CONE OF LIGHT DIAGRAM



## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

Model No.	T34FAHE2X4/17W/4 000K	Sample ID.	K1
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
119.99	60	0.138	16.4	0.993	7.20%
277.00	60	0.069	17.4	0.913	7.46%

## 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\*\*\*\*\*