

# 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

**DLF2211103-18a**

## Test Date

**2022/11/16**

## Issue Date

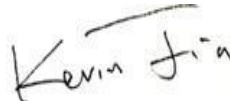
**2022/11/17**

## Prepared By



Wangzun Zhu

## Approved By



Kevin Jia

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## 1.0 Test Summary

DLC Technical Requirements v5.1

Indoor - Troffer - 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		3907
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 110	Premium 125	128.9
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		30.3
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	9.07%
		20.00%	277V	7.84%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.994
		0.9	277V	0.983
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	5029±355	4897
		4 step	5029±220	
Minimum CRI (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥80		81
Minimum R9 (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥0		4
Minimum Rf (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥70		82
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%		76.48%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<22		19.3
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		1.28
Input Voltage (V)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		120
(Goniophotometer - Section 4.2)		Non-Worst Case		277
Input Current (A)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		0.254
(Goniophotometer - Section 4.2)		Non-Worst Case		0.111
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		30.3
(Goniophotometer - Section 4.2)		Non-Worst Case		30.1

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2022/11/16	T34FAHE2X4/30W/5000K	R1
2	Goniophotometer Test	2022/11/16	T34FAHE2X4/30W/5000K	R1
3	THD and PF Test	2022/11/16	T34FAHE2X4/30W/5000K	R1

### 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:** T34FAHE2X4/30W/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.	T34FAHE2X4/30W/500 0K	Sample ID.	R1
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
120.01	60	0.251	29.9	0.994
276.99	60	0.109	29.7	0.983

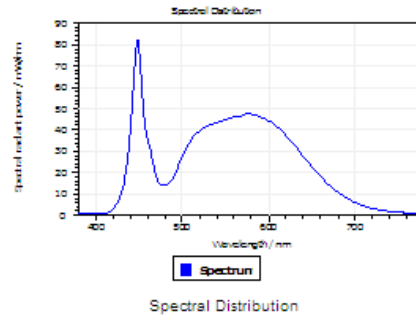
#### Test Result

CCT (K)	CRI	R9	Duv
4897	81	4	0.0041

Rf	Rg	IES Rcs,h1
82	97	-12%

## 4.1 Integrating Sphere Test

### Results

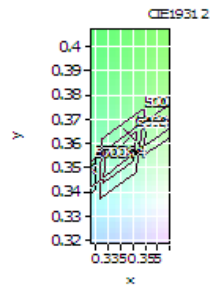


#### Spectral values

DominantWavelength 570.62 nm  
Purity 0.137  
PeakWavelength 448.38 nm  
Radiant Power 9.185 W  
Width50%:

#### Color Coordinates

Correlated Color Temperat 4897 K  
x: 0.3490 u: 0.2097 u': 0.2097  
y: 0.3630 v: 0.3271 v': 0.4907  
CRI01 78.2 CRI09 4.4  
CRI02 84.2 CRI10 63.2  
CRI03 89.2 CRI11 78.9  
CRI04 81.2 CRI12 53.2  
CRI05 78.9 CRI13 79.3  
CRI06 78.7 CRI14 94.1  
CRI07 87.6 CRI15 72.2  
CRI08 67.3 CRI16 71.7  
ResultsCRI 80.7



PlanckDistance 4.1E-003

## 4.1 Integrating Sphere Test

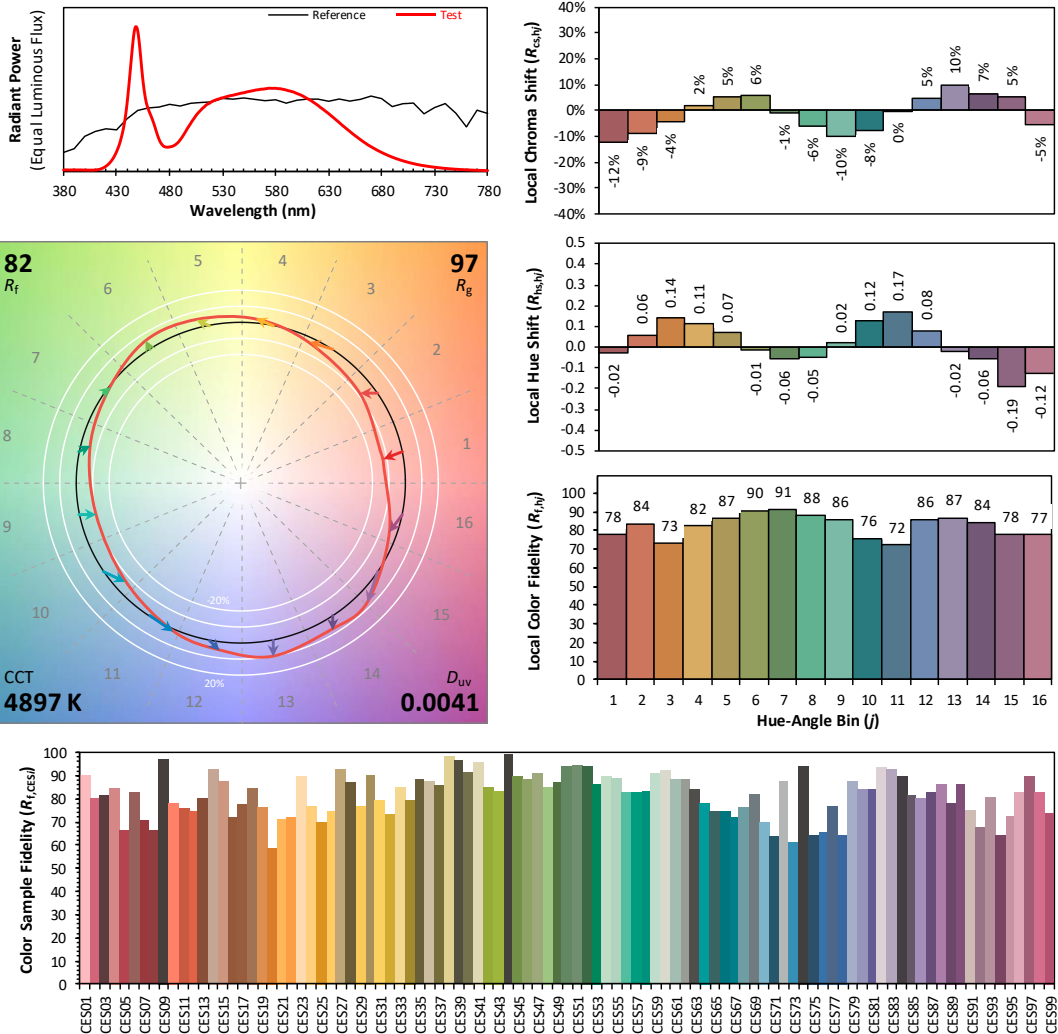
### IES TM-30-18 Color Rendition Report

Source: DLF2211103-18a

Manufacturer: RAB Lighting Inc.

Date: 2022/11/16

Model: T34FAHE2X4/30W/5000K



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

$x$  0.3490  
 $y$  0.3630  
 $u'$  0.2097  
 $v'$  0.4907

CIE 13.3-1995  
(CRI)  
 $R_a$  81  
 $R_g$  11

## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

Model No.	T34FAHE2X4/30W/5000K	Sample ID.	R1
Operate 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 parameters 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	120.05	60	0.254	30.3	0.993
NON-WROST CASE	277.01	60	0.111	30.1	0.982

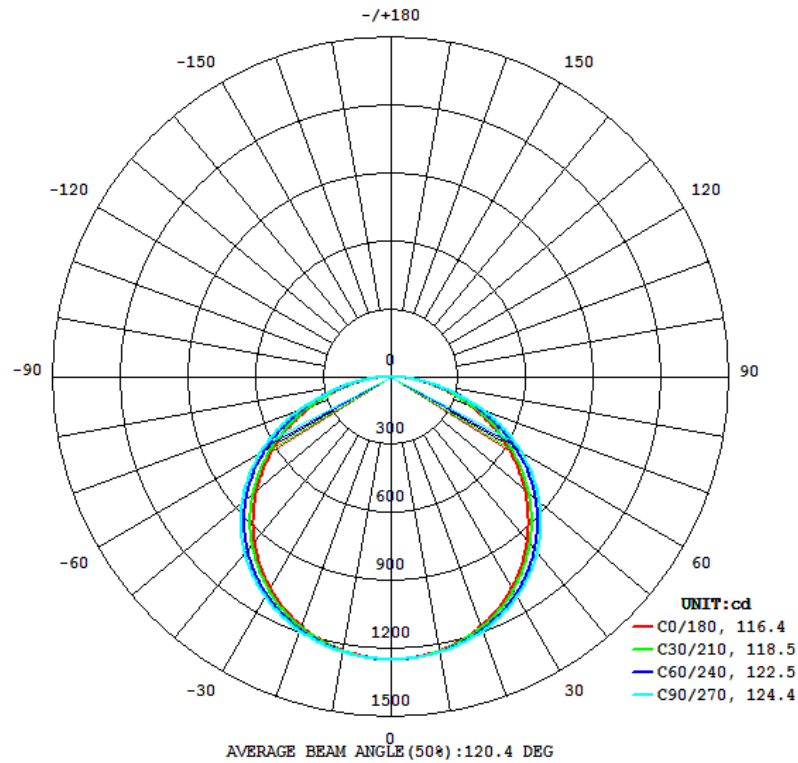
#### Test Result

Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
3907	164.8	166.0	116.4	124.4	128.9

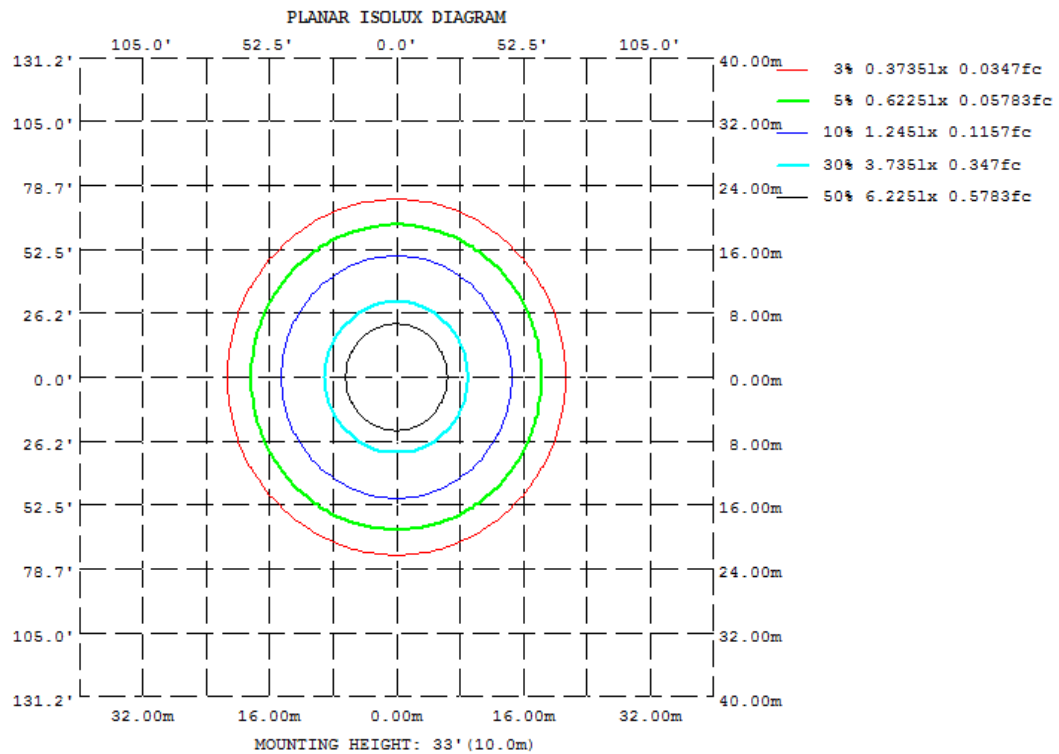
Zonal Lumen Requirement (0°-60°)	UGR (X=4H, Y=8H, 70/50/20%)	SC: 0-180°	SC: 90-270°
76.48%	19.3	1.34	1.28

## 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	1227	1231	1233	1231	1227	1231	1233	1231
20	1170	1181	1191	1181	1170	1181	1191	1181
30	1075	1098	1118	1098	1075	1098	1118	1098
40	944.1	977.3	1011	977.3	944.1	977.3	1011	977.3
50	779.7	820.8	863.5	820.8	779.7	820.8	863.5	820.8
60	588.0	628.1	671.8	628.1	588.0	628.1	671.8	628.1
70	379.0	408.5	440.2	408.5	379.0	408.5	440.2	408.5
80	171.6	184.4	193.4	184.4	171.6	184.4	193.4	184.4
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	14.6	16.2	14.9	16.6	16.9	13.9	15.5	14.2	15.9	16.2
	3H	16.6	18.1	16.9	18.4	18.8	15.8	17.3	16.1	17.6	18.0
	4H	17.3	18.8	17.7	19.1	19.5	16.5	17.9	16.9	18.3	18.7
	6H	17.9	19.3	18.3	19.6	20.0	17.1	18.4	17.5	18.8	19.2
	8H	18.1	19.4	18.5	19.8	20.2	17.3	18.5	17.7	18.9	19.3
	12H	18.2	19.5	18.7	19.8	20.3	17.4	18.6	17.8	19.0	19.4
4H	2H	15.2	16.6	15.6	17.0	17.3	14.6	16.1	15.0	16.4	16.8
	3H	17.4	18.6	17.8	19.0	19.4	16.8	18.0	17.2	18.4	18.8
	4H	18.3	19.4	18.8	19.8	20.3	17.6	18.7	18.0	19.1	19.6
	6H	19.0	20.0	19.5	20.4	20.9	18.3	19.3	18.8	19.7	20.2
	8H	19.3	20.2	19.8	20.6	21.1	18.6	19.5	19.0	19.9	20.4
	12H	19.5	20.3	19.9	20.7	21.2	18.7	19.6	19.2	20.0	20.5
8H	4H	18.6	19.5	19.1	20.0	20.4	18.0	18.9	18.5	19.4	19.8
	6H	19.5	20.2	20.0	20.7	21.2	18.9	19.6	19.3	20.1	20.6
	8H	19.8	20.5	20.3	21.0	21.5	19.2	19.8	19.7	20.3	20.8
	12H	20.1	20.7	20.6	21.2	21.7	19.4	20.0	19.9	20.5	21.1
12H	4H	18.7	19.5	19.2	20.0	20.4	18.1	18.9	18.6	19.4	19.8
	6H	19.6	20.2	20.1	20.7	21.2	18.9	19.6	19.5	20.1	20.6
	8H	19.9	20.5	20.4	21.0	21.6	19.3	19.9	19.8	20.4	21.0

Maximum UGR = 21.7

## 4.2 Goniophotometer Test

### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	118.25	0 - 10	118.25	3.03%
10-20	341.81	0 - 20	460.06	11.77%
20-30	527.38	0 - 30	987.44	25.27%
30-40	652.05	0 - 40	1639.49	41.96%
40-50	697.26	0 - 50	2336.75	59.81%
50-60	651.41	0 - 60	2988.16	76.48%
60-70	515.50	0 - 70	3503.66	89.67%
70-80	311.24	0 - 80	3814.90	97.64%
80-90	92.32	0 - 90	3907.22	100.00%
90-100	0.00	0 - 100	3907.22	100.00%
100-110	0.00	0 - 110	3907.22	100.00%
110-120	0.00	0 - 120	3907.22	100.00%
120-130	0.00	0 - 130	3907.22	100.00%
130-140	0.00	0 - 140	3907.22	100.00%
140-150	0.00	0 - 150	3907.22	100.00%
150-160	0.00	0 - 160	3907.22	100.00%
160-170	0.00	0 - 170	3907.22	100.00%
170-180	0.00	0 - 180	3907.22	100.00%

## 4.2 Goniophotometer Test

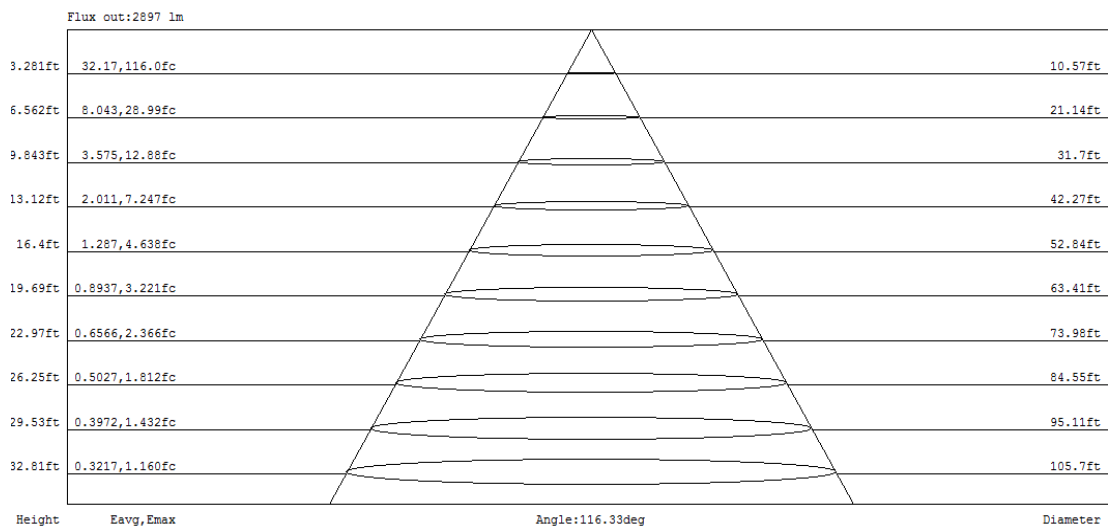
### COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

#### 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.	T34FAHE2X4/30W/5000K	Sample ID.	R1
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
120.01	60	0.251	29.9	0.994	9.07%
276.99	60	0.109	29.7	0.983	7.84%

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