

Photometric Test Report

Relevant Standards

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

Prepared For

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Project Number

DLF2211103

Report Number

DLF2211103-6a

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		2963
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 110	Premium 125	127.7
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		23.2
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	7.84%
		20.00%	277V	6.45%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.994
		0.9	277V	0.957
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	5029±355	4891
		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		5
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%		77.46%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<22		20.2
SC: 0-180° (Goniophotometer - Section 4.2)	IES LM-79-2008	1.0-2.0		1.30
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		0.088
(Goniophotometer - Section 4.2)		Non-Worst Case		0.190
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		23.2
(Goniophotometer - Section 4.2)		Non-Worst Case		22.6

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2022/11/16	T34FAHE2X2/23W/5000K	F1
2	Goniophotometer Test	2022/11/16	T34FAHE2X2/23W/5000K	F1
3	THD and PF Test	2022/11/16	T34FAHE2X2/23W/5000K	F1

Remark(If any)

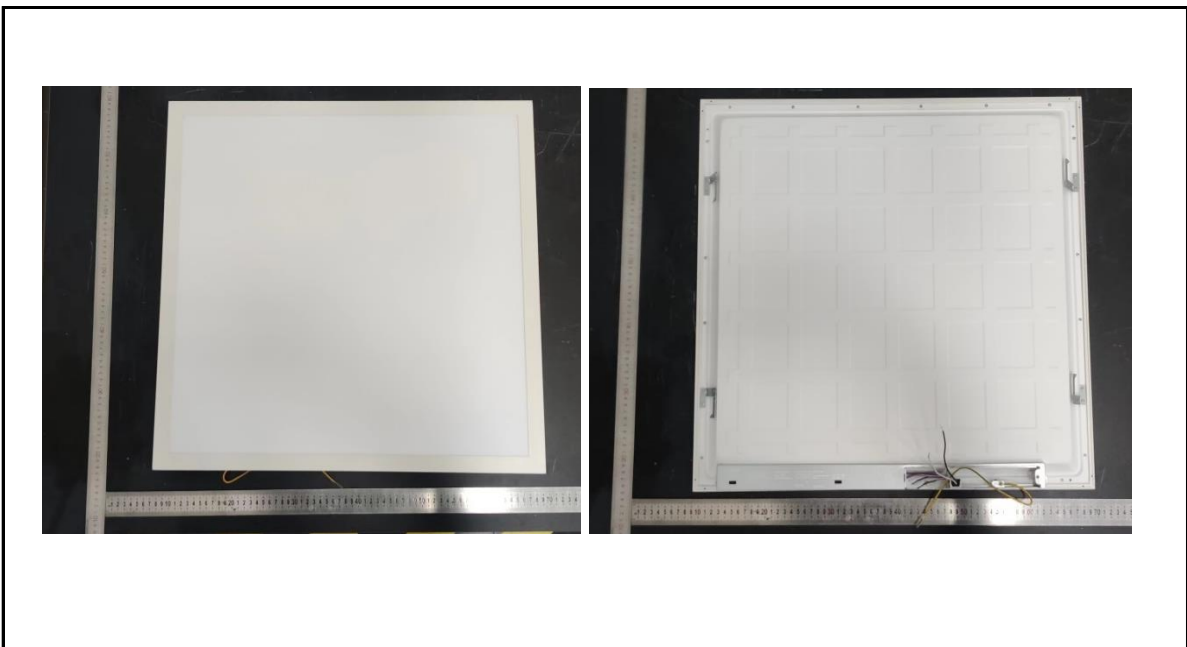
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3.0 Production Description

Luminaire Description: T34FAHE2X2/23W/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.	T34FAHE2X2/23W/500 0K	Sample ID.	F1
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 ± 0.2 percent under load.

The sample was measured using 4π 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
120.00	60	0.189	22.5	0.994
276.99	60	0.087	23.1	0.957

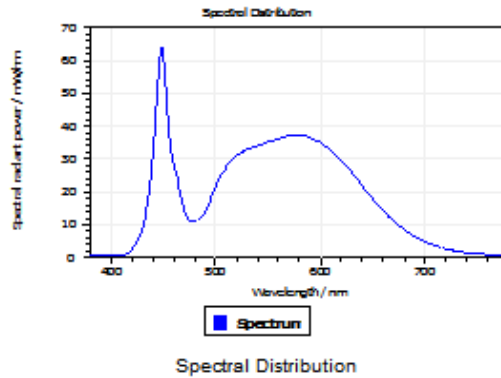
Test Result

CCT (K)	CRI	R9	Duv
4891	81	5	0.0037

Rf	Rg	IES Rcs,h1
82	97	-12%

4.1 Integrating Sphere Test

Results



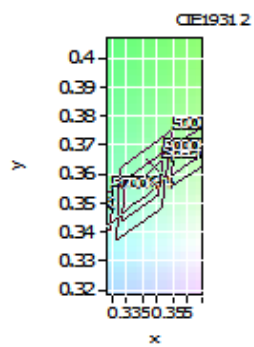
Spectral values

DominantWavelength 570.92 nm
Purity 0.135
PeakWavelength 448.42 nm
Radiant Power 7.231 W
Width50%:

Color Coordinates

Correlated Color Temperat 4891 K
x: 0.3491 u: 0.2100 u': 0.2100
y: 0.3624 v: 0.3269 v': 0.4904

CRI01	78.4	CRI09	5.3
CRI02	84.3	CRI10	63.4
CRI03	89.1	CRI11	80.1
CRI04	81.4	CRI12	53.4
CRI05	79.0	CRI13	79.5
CRI06	78.8	CRI14	94.1
CRI07	87.6	CRI15	72.6
CRI08	67.6	CRI16	72.1
ResultsCRI	80.8		



PlanckDistance 3.7E-003

4.1 Integrating Sphere Test

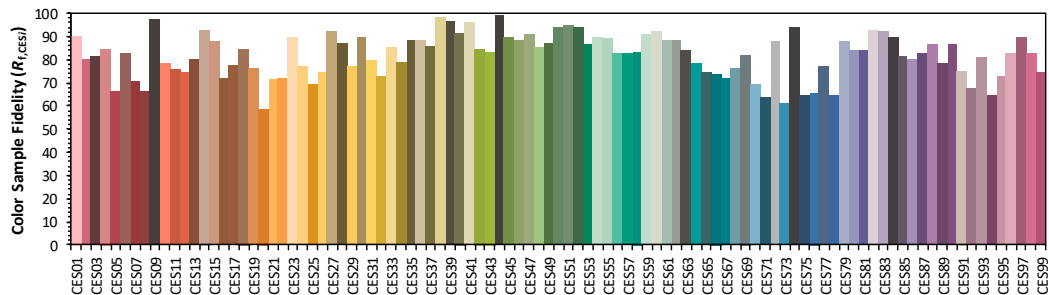
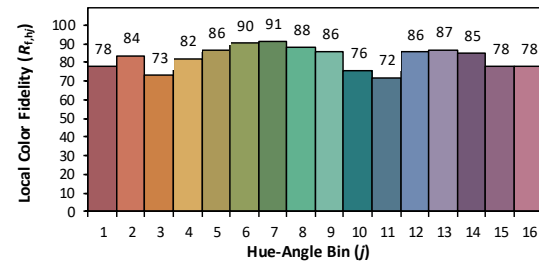
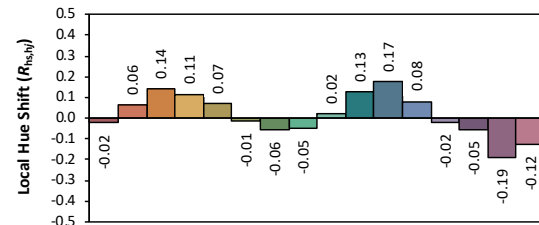
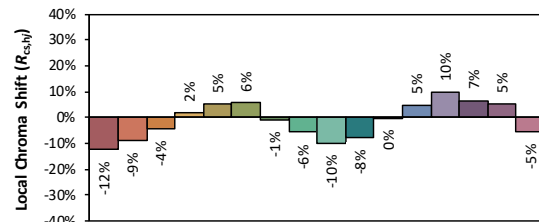
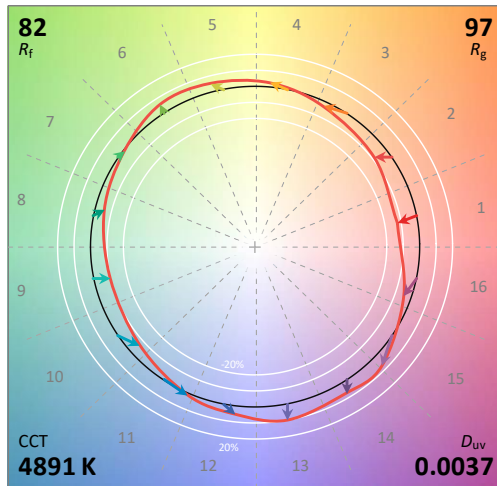
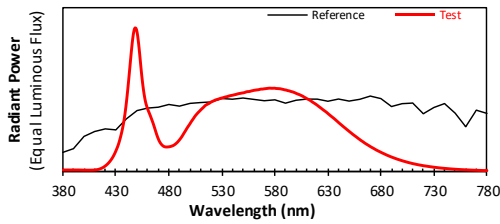
IES TM-30-18 Color Rendition Report

Source: DLF2211103-6a

Manufacturer: RAB Lighting Inc.

Date: 2022/11/16

Model: T34FAHE2X2/23W/5000K



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

x 0.3491
 y 0.3624
 u' 0.2100
 v' 0.4904

CIE 13.3-1995
(CRI)

R_a 82
 R_g 12

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	T34FAHE2X2/23W/5000K	Sample ID.	F1
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	276.95	60	0.088	23.2	0.954
NON-WROST CASE	119.99	60	0.190	22.6	0.991

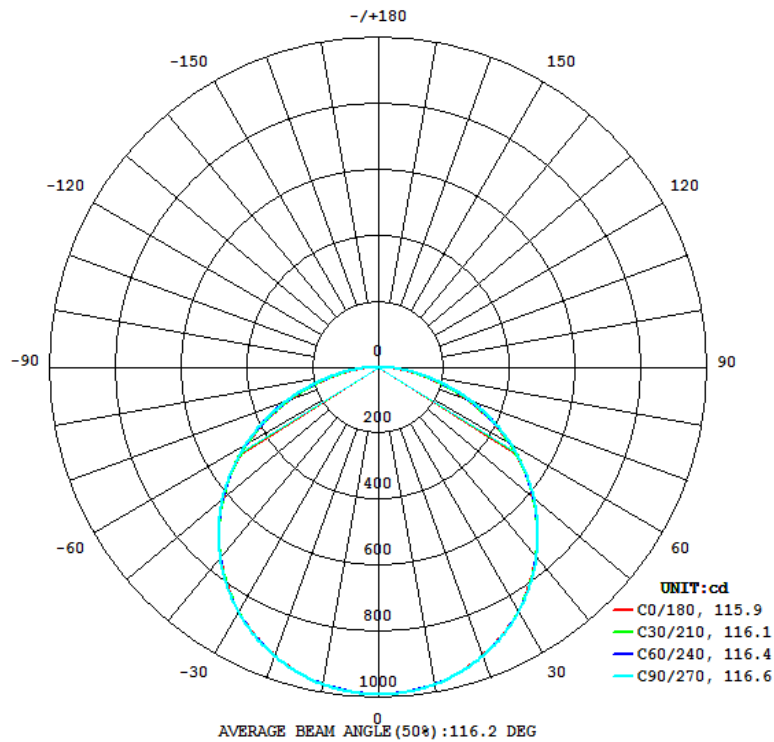
Test Result

Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
2963	163.7	164.5	115.9	116.6	127.7

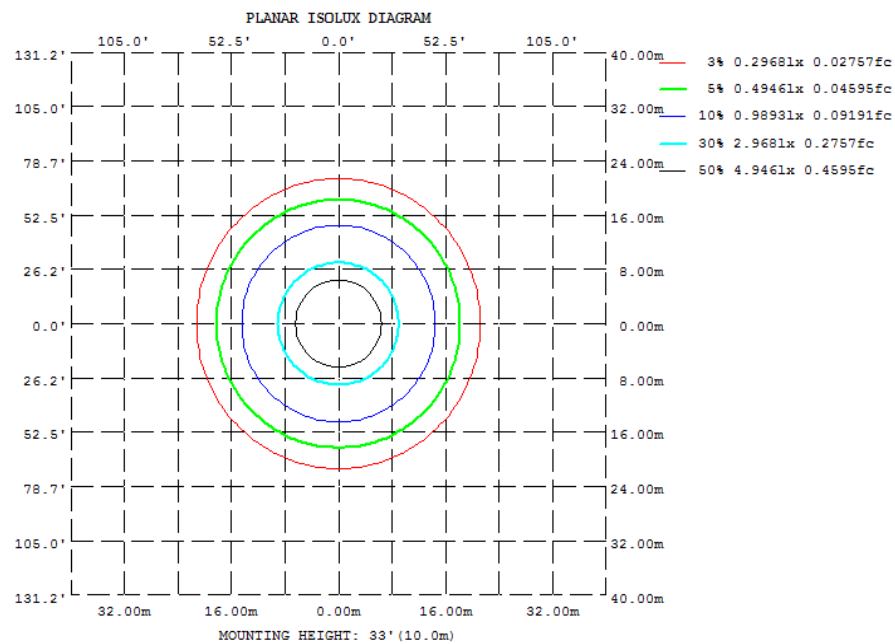
Zonal Lumen Requirement (0°-60°)	UGR (X=4H, Y=8H, 70/50/20%)	SC: 0-180°	SC: 90-270°
77.46%	20.2	1.30	1.28

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	974.4	975.1	974.9	975.1	974.4	975.1	974.9	975.1
20	928.1	929.1	930.2	929.1	928.1	929.1	930.2	929.1
30	852.4	853.6	854.1	853.6	852.4	853.6	854.1	853.6
40	748.1	749.3	750.0	749.3	748.1	749.3	750.0	749.3
50	616.6	618.6	620.5	618.6	616.6	618.6	620.5	618.6
60	462.1	465.7	467.8	465.7	462.1	465.7	467.8	465.7
70	292.1	297.6	301.0	297.6	292.1	297.6	301.0	297.6
80	126.2	132.4	134.3	132.4	126.2	132.4	134.3	132.4
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

Walls

Floor Cavity

Room Size

X=2H Y=2H

3H

4H

6H

8H

12H

4H

3H

4H

6H

8H

12H

8H

6H

8H

12H

12H

6H

8H

Maximum UGR = 22.7

70

50

20

15.6

17.5

18.3

18.8

19.0

19.2

16.3

18.4

19.3

20.0

20.2

20.4

19.6

20.5

20.8

21.1

19.7

20.6

20.9

70

30

20

17.3

19.0

19.6

20.2

20.3

20.4

17.7

19.6

20.4

21.0

21.1

21.2

20.5

21.2

21.5

21.6

20.5

21.2

21.5

50

30

20

16.0

17.9

18.7

19.2

19.5

19.6

16.7

18.8

19.7

20.5

20.7

20.9

20.1

21.0

21.3

21.4

20.1

21.1

21.4

50

30

20

17.6

19.4

19.7

20.0

20.7

21.1

18.1

19.4

20.8

21.4

21.6

22.0

18.4

19.9

21.2

21.8

21.4

21.7

22.2

30

30

20

17.9

19.7

20.4

20.9

21.1

21.2

18.4

20.4

21.2

21.8

22.0

22.2

21.4

22.2

22.4

22.7

21.4

22.2

22.6

70

50

20

15.6

17.4

18.1

18.7

18.8

19.0

16.2

18.3

19.2

19.8

20.1

20.2

19.5

20.3

20.6

20.9

19.6

20.4

20.8

70

30

20

17.2

19.0

19.6

20.0

20.1

20.2

17.7

19.5

20.3

20.8

21.0

21.0

20.4

21.1

21.3

21.5

20.4

21.1

21.4

50

30

20

15.9

17.8

18.5

19.1

19.3

19.4

16.6

18.7

19.6

20.3

20.5

20.6

20.0

20.8

21.1

21.4

20.0

20.9

21.3

50

30

20

17.6

19.3

19.9

20.4

20.5

20.6

18.0

19.9

20.7

21.2

21.4

21.5

20.9

21.5

21.8

22.0

20.8

21.5

21.8

50

30

20

15.9

17.8

18.5

19.1

19.3

19.4

16.6

18.7

19.6

20.3

20.5

20.6

20.0

20.8

21.1

21.4

20.0

20.9

21.3

50

30

20

17.6

19.3

19.9

20.4

20.5

20.6

18.0

19.9

20.7

4.2 Goniophotometer Test

ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	93.79	0 - 10	93.79	3.16%
10-20	269.84	0 - 20	363.63	12.27%
20-30	412.50	0 - 30	776.13	26.19%
30-40	503.40	0 - 40	1279.53	43.18%
40-50	529.72	0 - 50	1809.25	61.05%
50-60	486.08	0 - 60	2295.33	77.46%
60-70	377.76	0 - 70	2673.09	90.21%
70-80	224.55	0 - 80	2897.64	97.78%
80-90	65.71	0 - 90	2963.35	100.00%
90-100	0.00	0 - 100	2963.35	100.00%
100-110	0.00	0 - 110	2963.35	100.00%
110-120	0.00	0 - 120	2963.35	100.00%
120-130	0.00	0 - 130	2963.35	100.00%
130-140	0.00	0 - 140	2963.35	100.00%
140-150	0.00	0 - 150	2963.35	100.00%
150-160	0.00	0 - 160	2963.35	100.00%
160-170	0.00	0 - 170	2963.35	100.00%
170-180	0.00	0 - 180	2963.35	100.00%

4.2 Goniophotometer Test

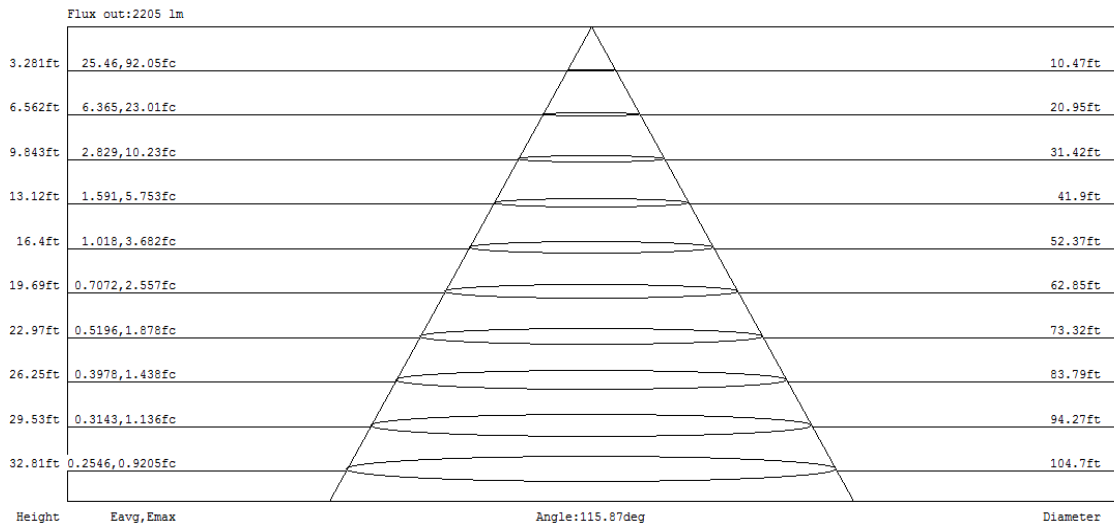
COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

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	91	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	61	54	79	68	60	53	66	58	53	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	40	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.	T34FAHE2X2/23W/5000K	Sample ID.	F1
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
120.00	60	0.189	22.5	0.994	7.84%
276.99	60	0.087	23.1	0.957	6.45%

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*****