

Photometric Test Report

Relevant Standards

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

Prepared For

RAB Lighting Inc.

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Project Number

DLF2305110

Report Number

DLF2305110-2a

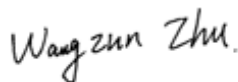
Test Date

2023/5/19

Issue Date

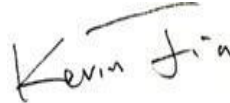
2023/5/22

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 - Linear Ambient - Direct Linear Ambient Luminaires				
Requirement Category	Test Method	Requirements		Test value
Luminaire Output (lm) (Goniophotometer - Section 4.2)	IES LM-79-2008	750		6169
Lumen/ft (Goniophotometer - Section 4.2)	IES LM-79-2008	≥375		1542
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 115	Premium 130	138.0
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		44.7
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	6.02%
		20.00%	277V	10.11%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.996
		0.9	277V	0.962
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	3465±245	3471
		4 step	3465±124	
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		12
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		98
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	≥40%		72.88%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<22		23.7
Input Voltage (V)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		120
(Goniophotometer - Section 4.2)		Non-Wrost Case		277
Input Current (A)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		0.374
(Goniophotometer - Section 4.2)		Non-Wrost Case		0.158
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		44.7
(Goniophotometer - Section 4.2)		Non-Wrost Case		42.0

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023/5/19	CW4/44W/3500K	B1
2	Goniophotometer Test	2023/5/19	CW4/44W/3500K	B1
3	THD and PF Test	2023/5/19	CW4/44W/3500K	B1

Remark(If any)

1、 This report shall not be used by the client to claim product endorsement by NVLAP, NIST or any agency of the US government.

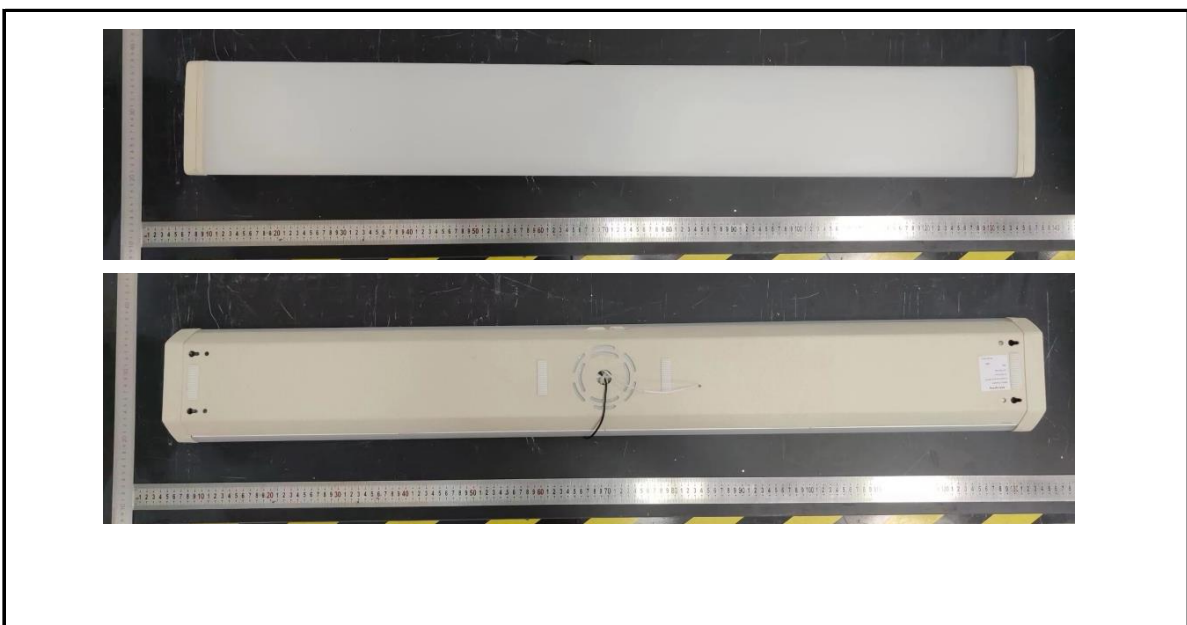
2、 The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing 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: CW4/44W/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.	CW4/44W/3500K	Sample ID.	B1
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
120.05	60	0.374	44.7	0.996
277.01	60	0.158	42.0	0.962

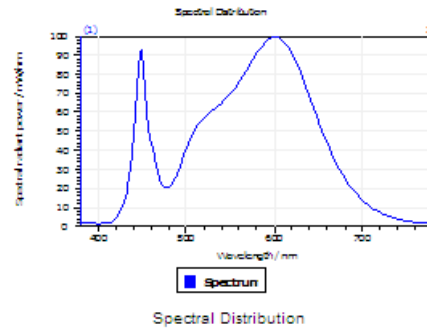
Test Result

CCT (K)	CRI	R9	Duv
3471	84	12	0.0023

Rf	Rg	IES Rcs,h1
85	98	-11%

4.1 Integrating Sphere Test

Results

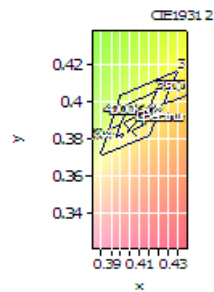


Spectral values

DominantWavelength 582.01 nm
Purity 0.370
PeakWavelength 600.62 nm
Radiant Power 16.29 W
Width50%:

Color Coordinates

Correlated Color Temperat 3471 K
x: 0.4045 u: 0.2375 u': 0.2375
y: 0.3852 v: 0.3392 v': 0.5088
CRI01 82.6 CRI09 12.2
CRI02 90.3 CRI10 77.6
CRI03 95.7 CRI11 83.2
CRI04 83.1 CRI12 70.2
CRI05 83.1 CRI13 84.4
CRI06 87.6 CRI14 97.9
CRI07 84.4 CRI15 75.9
CRI08 63.4 CRI16 74.2
ResultsCRI 83.8



PlanckDistance 2.3E-003

4.1 Integrating Sphere Test

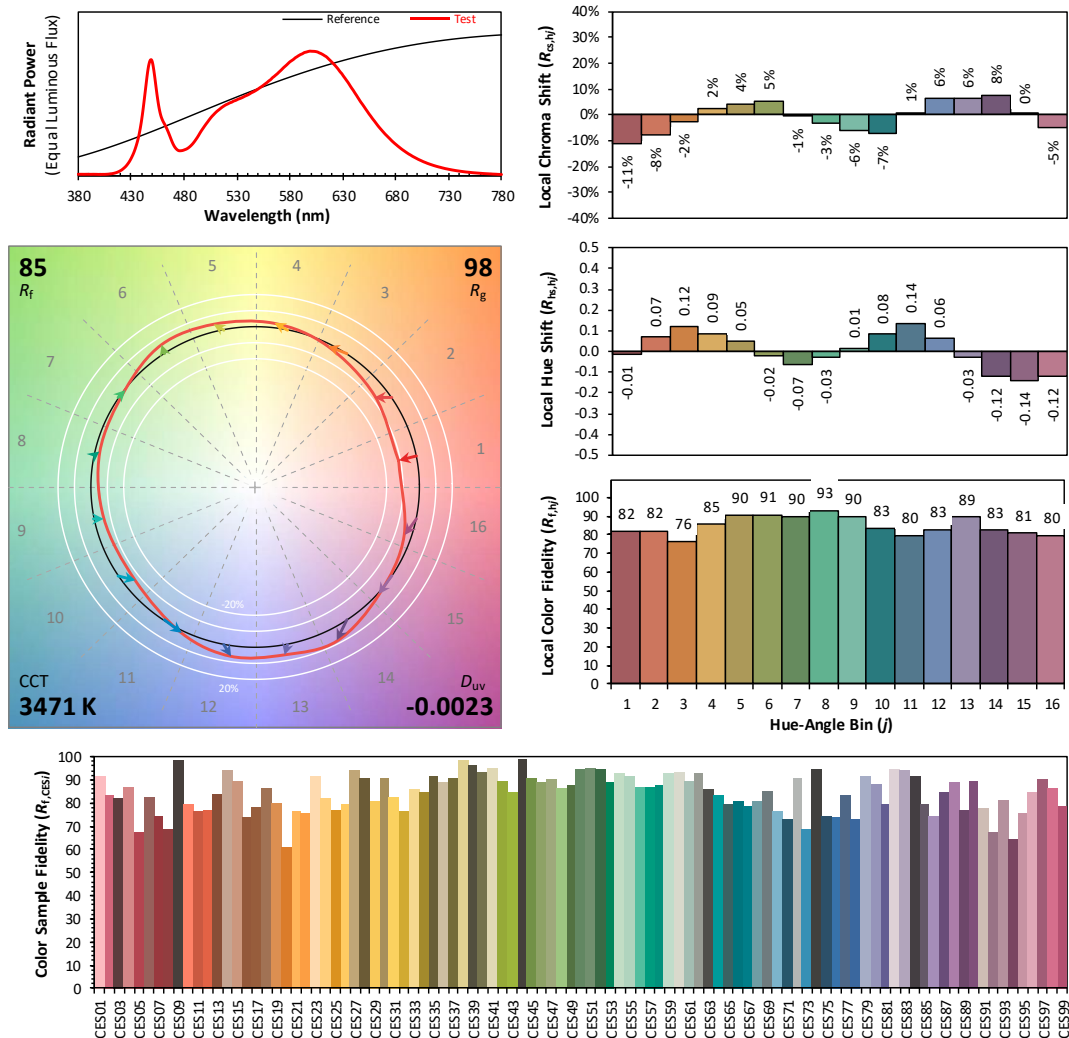
IES TM-30-18 Color Rendition Report

Source: DLF2305110-2a

Manufacturer: RAB Lighting Inc.

Date: 2023/5/19

Model: CW4/44W/3500K



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

x	0.4045
y	0.3852
u'	0.2375
v'	0.5088

CIE 13.3-1995
(CRI)

R_a	85
R_9	18

4.1 Integrating Sphere Test

Spectral Distribution over Visible Wavelength							
WL (nm)	Radiant (Watts/nm)	WL (nm)	Radiant (Watts/nm)	WL (nm)	Radiant (Watts/nm)	WL (nm)	Radiant (Watts/nm)
380	1.31E-03	485	2.31E-02	590	9.71E-02	695	1.62E-02
385	1.30E-03	490	2.77E-02	595	9.90E-02	700	1.39E-02
390	1.30E-03	495	3.43E-02	600	9.98E-02	705	1.19E-02
395	1.31E-03	500	4.06E-02	605	9.94E-02	710	1.01E-02
400	1.19E-03	505	4.63E-02	610	9.77E-02	715	8.61E-03
405	1.26E-03	510	5.09E-02	615	9.50E-02	720	7.35E-03
410	1.59E-03	515	5.44E-02	620	9.08E-02	725	6.25E-03
415	2.43E-03	520	5.72E-02	625	8.62E-02	730	5.33E-03
420	4.26E-03	525	5.90E-02	630	8.07E-02	735	4.54E-03
425	7.73E-03	530	6.10E-02	635	7.48E-02	740	3.88E-03
430	1.41E-02	535	6.27E-02	640	6.84E-02	745	3.30E-03
435	2.48E-02	540	6.48E-02	645	6.18E-02	750	2.86E-03
440	4.54E-02	545	6.71E-02	650	5.56E-02	755	2.44E-03
445	7.96E-02	550	6.96E-02	655	4.94E-02	760	2.12E-03
450	9.12E-02	555	7.26E-02	660	4.38E-02	765	1.81E-03
455	6.17E-02	560	7.60E-02	665	3.84E-02	770	1.57E-03
460	4.39E-02	565	7.95E-02	670	3.35E-02	775	1.35E-03
465	3.52E-02	570	8.33E-02	675	2.93E-02	780	1.15E-03
470	2.49E-02	575	8.74E-02	680	2.53E-02		
475	2.02E-02	580	9.13E-02	685	2.19E-02		
480	2.08E-02	585	9.45E-02	690	1.89E-02		

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	CW4/44W/3500K	Sample ID.	B1
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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, 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 ± 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	120.02	60	0.374	44.7	0.996
NON-WROST CASE	277.01	60	0.158	42.0	0.962

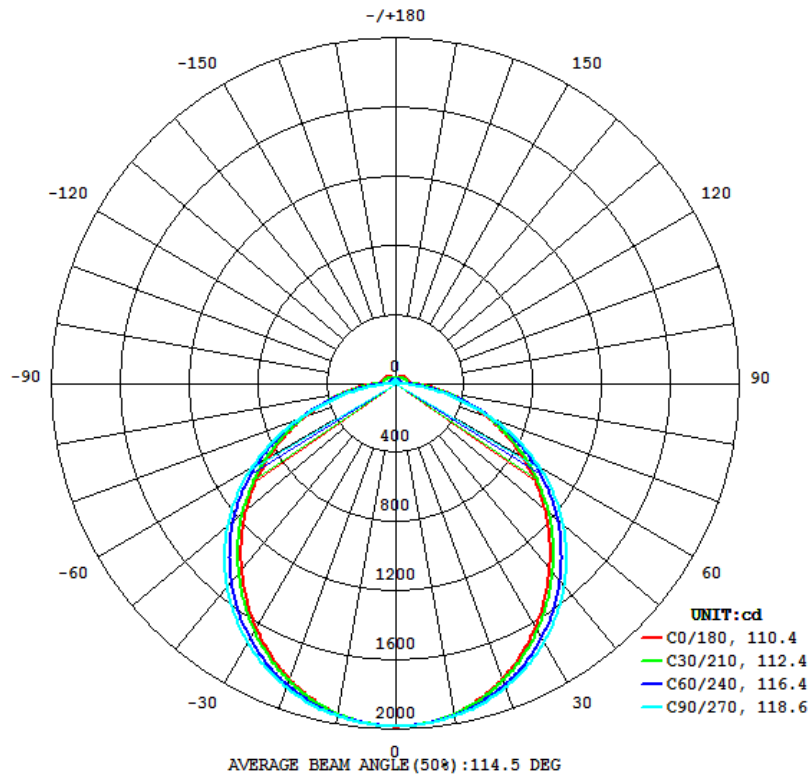
Test Result

Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
6169	169.0	162.2	110.4	118.6	138.0

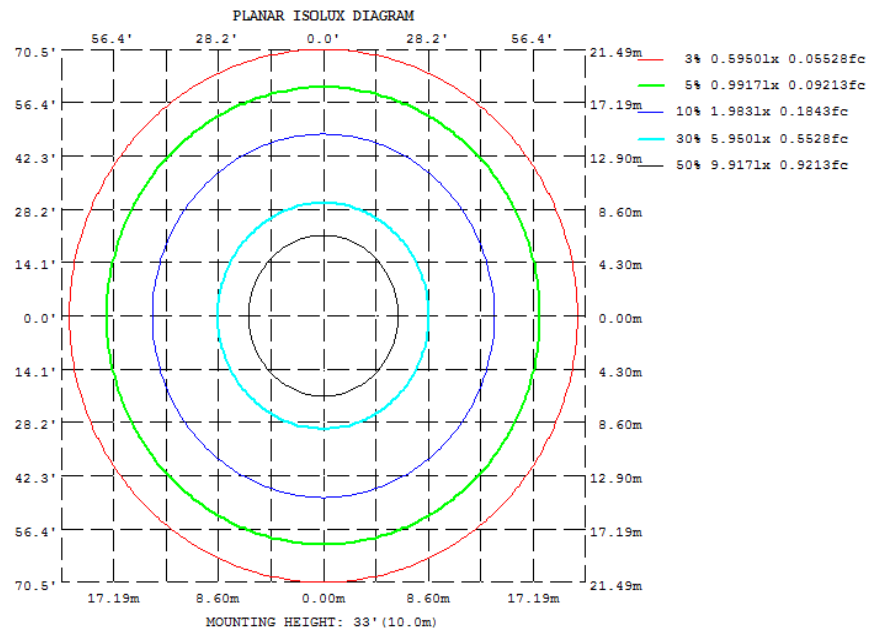
Zonal Lumen Requirement (0° - 60°)	UGR (X=4H, Y=8H, 70/50/20%)	Length(ft)	Lumen/ft
72.88%	23.7	4.00	1542

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	1940	1944	1952	1944	1940	1944	1952	1944
20	1816	1839	1867	1839	1816	1839	1867	1839
30	1627	1673	1726	1673	1627	1673	1726	1673
40	1394	1454	1528	1454	1394	1454	1528	1454
50	1137	1199	1278	1199	1137	1199	1278	1199
60	856.5	905.3	966.7	905.3	856.5	905.3	966.7	905.3
70	572.7	592.8	609.2	592.8	572.7	592.8	609.2	592.8
80	303.6	286.2	236.0	286.2	303.6	286.2	236.0	286.2
90	110.5	74.39	0.8083	74.39	110.5	74.39	0.8083	74.39
100	90.84	61.00	2.420	61.00	90.84	61.00	2.420	61.00
110	83.91	57.78	8.548	57.78	83.91	57.78	8.548	57.78
120	77.13	53.92	15.35	53.92	77.13	53.92	15.35	53.92
130	68.49	49.25	21.51	49.25	68.49	49.25	21.51	49.25
140	58.87	44.93	26.53	44.93	58.87	44.93	26.53	44.93
150	50.09	40.85	29.05	40.85	50.09	40.85	29.05	40.85
160	42.20	36.35	26.69	36.35	42.20	36.35	26.69	36.35
170	36.69	29.82	24.15	29.82	36.69	29.82	24.15	29.82
180	21.22	26.55	28.04	26.55	21.22	26.55	28.04	26.55
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											
X=2H	UGR Viewed Crosswise					UGR Viewed Endwise					
Y=2H	19.1	20.7	19.6	21.1	21.5	18.9	20.4	19.3	20.8	21.3	
3H	20.9	22.3	21.3	22.7	23.2	20.8	22.2	21.3	22.6	23.1	
4H	21.4	22.8	21.9	23.2	23.7	21.6	22.9	22.1	23.4	23.9	
6H	21.8	23.0	22.3	23.5	24.0	22.3	23.5	22.8	24.0	24.5	
8H	21.9	23.0	22.4	23.5	24.0	22.6	23.8	23.1	24.2	24.8	
12H	21.9	23.0	22.4	23.5	24.0	22.8	24.0	23.3	24.4	25.0	
4H	2H	19.7	21.0	20.2	21.5	22.0	19.5	20.8	20.0	21.3	21.8
	3H	21.7	22.8	22.2	23.3	23.8	21.6	22.8	22.1	23.2	23.8
	4H	22.4	23.4	22.9	23.9	24.4	22.6	23.6	23.1	24.1	24.6
	6H	22.8	23.7	23.4	24.3	24.8	23.4	24.3	23.9	24.8	25.4
	8H	22.9	23.8	23.5	24.3	24.9	23.7	24.6	24.3	25.1	25.7
	12H	23.0	23.7	23.5	24.3	24.9	24.1	24.8	24.6	25.4	26.0
8H	4H	22.7	23.5	23.2	24.0	24.6	22.9	23.7	23.4	24.2	24.8
	6H	23.3	24.0	23.8	24.5	25.1	23.8	24.5	24.4	25.1	25.7
	8H	23.4	24.0	24.0	24.6	25.2	24.2	24.9	24.8	25.5	26.1
	12H	23.5	24.1	24.1	24.6	25.3	24.7	25.2	25.3	25.8	26.5
12H	4H	22.7	23.5	23.3	24.0	24.6	22.9	23.6	23.4	24.2	24.8
	6H	23.3	24.0	23.9	24.5	25.2	23.9	24.5	24.5	25.0	25.7
	8H	23.6	24.1	24.1	24.7	25.3	24.4	24.9	24.9	25.5	26.1
Maximum UGR = 26.5											

4.2 Goniophotometer Test

ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	187.33	0 - 10	187.33	3.04%
10-20	536.38	0 - 20	723.71	11.73%
20-30	813.23	0 - 30	1536.94	24.91%
30-40	983.26	0 - 40	2520.20	40.85%
40-50	1029.74	0 - 50	3549.94	57.54%
50-60	946.33	0 - 60	4496.27	72.88%
60-70	742.70	0 - 70	5238.97	84.92%
70-80	455.88	0 - 80	5694.85	92.31%
80-90	168.78	0 - 90	5863.63	95.05%
90-100	62.83	0 - 100	5926.46	96.07%
100-110	56.61	0 - 110	5983.07	96.98%
110-120	51.12	0 - 120	6034.19	97.81%
120-130	43.78	0 - 130	6077.97	98.52%
130-140	35.19	0 - 140	6113.16	99.09%
140-150	26.32	0 - 150	6139.48	99.52%
150-160	17.59	0 - 160	6157.07	99.81%
160-170	9.34	0 - 170	6166.41	99.96%
170-180	2.68	0 - 180	6169.09	100.00%

4.2 Goniophotometer Test

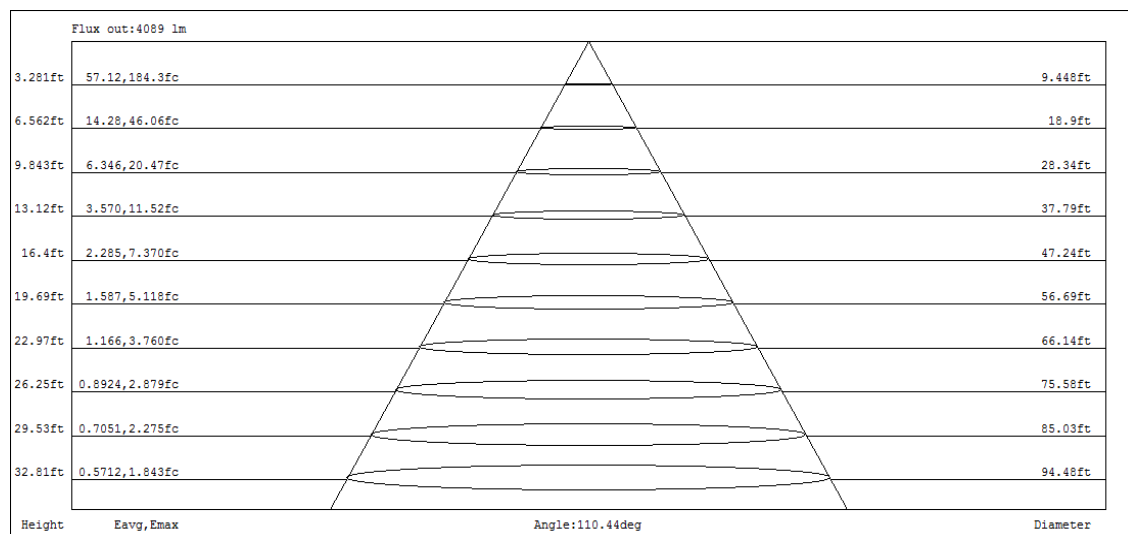
COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

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	118	118	118	118	115	115	115	115	108	108	108	103	103	103	97	97	97	95
1	107	102	98	94	104	99	95	92	94	91	88	89	87	84	85	83	81	78
2	97	89	82	76	94	86	80	74	82	76	72	78	73	69	74	70	67	65
3	88	78	69	63	85	76	68	62	72	65	60	68	63	58	65	61	57	54
4	81	69	60	53	78	67	59	52	64	57	51	61	55	50	58	53	48	46
5	74	61	52	45	72	60	51	45	57	50	44	54	48	43	52	47	42	40
6	68	55	46	39	66	54	45	39	51	44	38	49	43	38	47	41	37	35
7	63	50	41	35	61	49	40	34	47	39	34	45	38	33	43	37	33	31
8	59	45	37	31	57	44	36	31	43	35	30	41	34	30	40	34	29	27
9	55	42	33	28	53	41	33	28	39	32	27	38	31	27	36	31	26	24
10	52	38	30	25	50	38	30	25	36	29	25	35	29	24	34	28	24	22

CONE OF LIGHT DIAGRAM



4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	CW4/44W/3500K	Sample ID.	B1
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
120.05	60	0.374	44.7	0.996	6.02%
277.01	60	0.158	42.0	0.962	10.11%

5.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
DLF107	Integrating Sphere System	2022/12/24	2023/12/23
DLF108	Auxiliary Lamp	2022/12/24	2023/12/23
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-directional	2022/12/24	2023/12/23
DLF116	AC Power Source	2022/12/16	2023/12/15
DLF516	Power Meter	2022/12/16	2023/12/15
DLF112	Temperature Recorder	2022/12/28	2023/12/27
DLF114	Temperature & Humidity Datalogger	2022/12/28	2023/12/27
DLF101	Goniophotometer	2022/12/24	2023/12/23
DLF511	AC Power Source	2022/12/16	2023/12/15
DLF512	AC Power Source	2022/12/16	2023/12/15
DLF513	AC Power Source	2022/12/16	2023/12/15
DLF507	DC Power Source	2022/12/16	2023/12/15
DLF111	Temperature & Humidity Datalogger	2022/12/28	2023/12/27
DLF119	Power Meter	2022/12/16	2023/12/15
DLF031	Temperature data logger	2022/6/22	2023/6/21
DLF073	Power Analyzer	2022/6/22	2023/6/21
DLF003	Temperature & Humidity Datalogger	2022/6/22	2023/6/21

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