

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

DLF2305110-8a

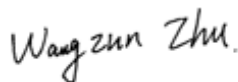
Test Date

2023/5/23

Issue Date

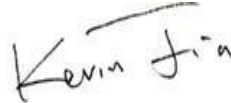
2023/5/25

Prepared By



Wangzun Zhu

Approved By



Kevin Jia

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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		3001
Lumen/ft (Goniophotometer - Section 4.2)	IES LM-79-2008	≥375		1500
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 115	Premium 130	128.2
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		23.4
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	1.26%
		20.00%	277V	8.99%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.998
		0.9	277V	0.968
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	5029±355	5080
		4 step	5029±220	
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		9
Minimum Rf (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥70		83
Minimum Rg (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥89		92
Minimum IES Rcs,h1 (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	-12%≤IES Rcs,h1≤+23%		-13%
Zonal Lumen Requirement (0°-60°) (Goniophotometer - Section 4.2)	IES LM-79-2008	≥40%		73.93%
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		277
(Goniophotometer - Section 4.2)		Non-Wrost Case		120
Input Current (A)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		0.087
(Goniophotometer - Section 4.2)		Non-Wrost Case		0.195
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		23.4
(Goniophotometer - Section 4.2)		Non-Wrost Case		23.4

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023/5/23	CW2/22W/5000K	H1
2	Goniophotometer Test	2023/5/23	CW2/22W/5000K	H1
3	THD and PF Test	2023/5/23	CW2/22W/5000K	H1

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.

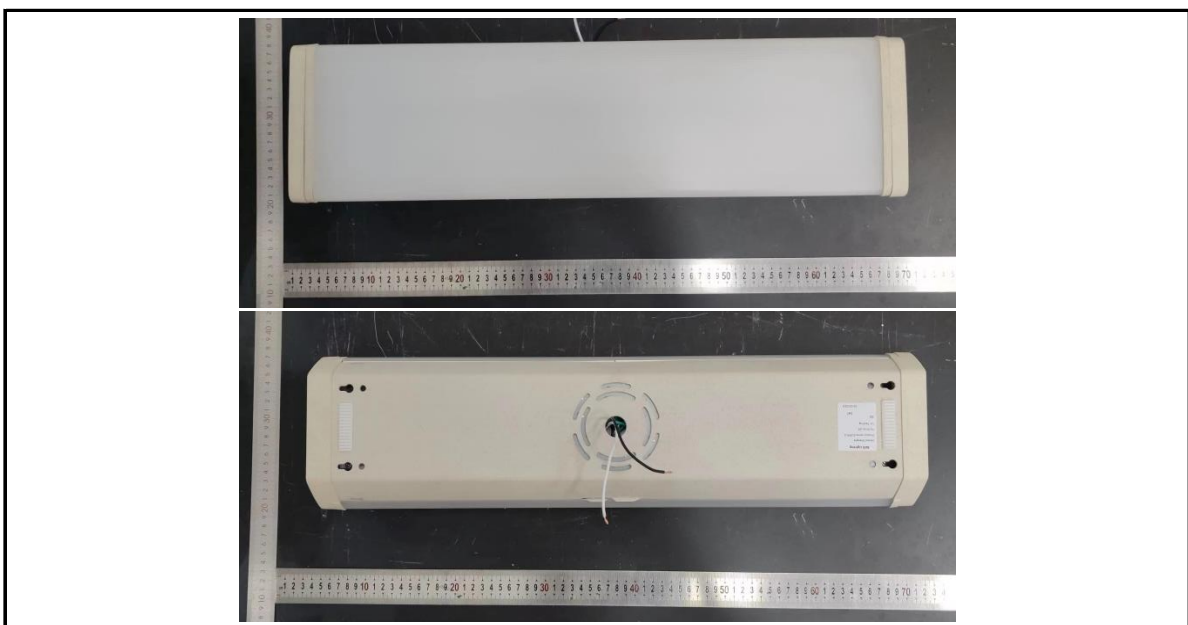
2、 The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing 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: CW2/22W/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.	CW2/22W/5000K	Sample ID.	H1
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
120.01	60	0.195	23.4	0.998
276.94	60	0.087	23.4	0.968

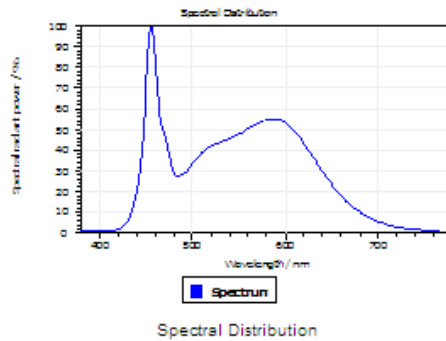
Test Result

CCT (K)	CRI	R9	Duv
5080	84	9	0.0011

Rf	Rg	IES Rcs,h1
83	92	-13%

4.1 Integrating Sphere Test

Results

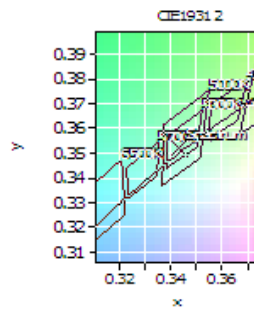


Spectral values

DominantWavelength 570.33 nm
Purity 0.087
PeakWavelength 455.75 nm
Radiant Power 8.398 W
Width50%:

Color Coordinates

Correlated Color Temperat 5080 K
x: 0.3431 u: 0.2098 u': 0.2098
v: 0.3523 v: 0.3231 v': 0.4847
CRI01 83.5 CRI09 8.6
CRI02 93.6 CRI10 83.5
CRI03 94.3 CRI11 79.9
CRI04 80.2 CRI12 61.9
CRI05 83.1 CRI13 87.2
CRI06 88.3 CRI14 97.7
CRI07 84.2 CRI15 77.8
CRI08 65.0 CRI16 72.7
ResultsCRI 84.0



PlanckDistance 1.1E-003

4.1 Integrating Sphere Test

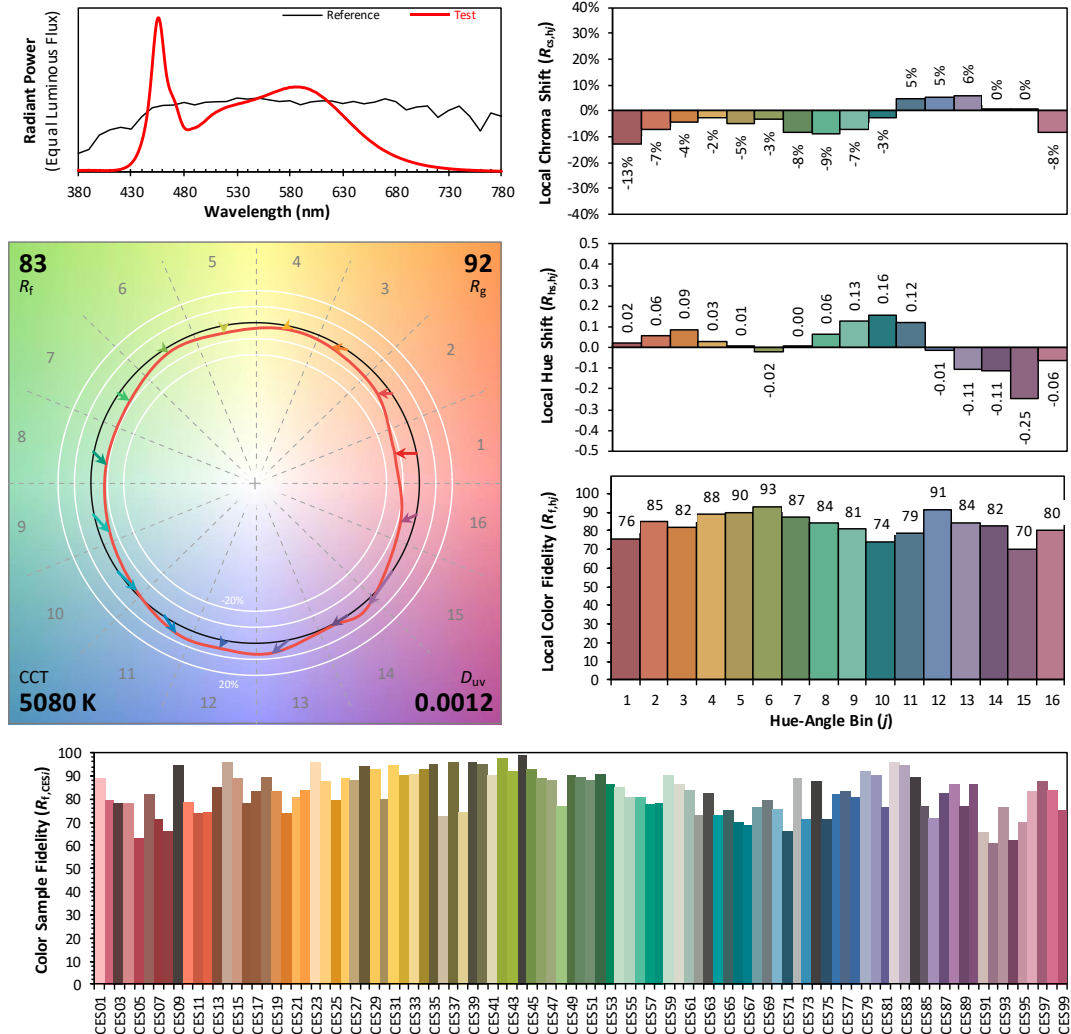
IES TM-30-18 Color Rendition Report

Source: DLF2305110-8a

Manufacturer: RAB Lighting Inc.

Date: 2023/5/23

Model: CW2/22W/5000K



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

x 0.3431
 y 0.3523
 u' 0.2098
 v' 0.4847

CIE 13.3-1995
(CRI)

R_a 85
 R_g 12

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	8.16E-04	485	2.18E-02	590	4.37E-02	695	5.07E-03
385	8.05E-04	490	2.27E-02	595	4.33E-02	700	4.33E-03
390	8.27E-04	495	2.42E-02	600	4.22E-02	705	3.69E-03
395	7.89E-04	500	2.63E-02	605	4.09E-02	710	3.13E-03
400	7.00E-04	505	2.88E-02	610	3.89E-02	715	2.68E-03
405	6.87E-04	510	3.07E-02	615	3.68E-02	720	2.30E-03
410	7.15E-04	515	3.21E-02	620	3.44E-02	725	1.95E-03
415	8.88E-04	520	3.33E-02	625	3.18E-02	730	1.67E-03
420	1.33E-03	525	3.41E-02	630	2.91E-02	735	1.43E-03
425	2.33E-03	530	3.49E-02	635	2.64E-02	740	1.22E-03
430	4.34E-03	535	3.55E-02	640	2.38E-02	745	1.06E-03
435	8.24E-03	540	3.62E-02	645	2.11E-02	750	9.03E-04
440	1.56E-02	545	3.71E-02	650	1.87E-02	755	7.84E-04
445	2.90E-02	550	3.80E-02	655	1.64E-02	760	6.76E-04
450	5.54E-02	555	3.89E-02	660	1.43E-02	765	5.83E-04
455	7.91E-02	560	4.00E-02	665	1.24E-02	770	5.06E-04
460	6.60E-02	565	4.11E-02	670	1.08E-02	775	4.36E-04
465	4.55E-02	570	4.21E-02	675	9.33E-03	780	3.76E-04
470	3.79E-02	575	4.29E-02	680	8.03E-03		
475	2.98E-02	580	4.37E-02	685	6.90E-03		
480	2.29E-02	585	4.38E-02	690	5.93E-03		

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	CW2/22W/5000K	Sample ID.	H1
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	277.02	60	0.087	23.4	0.968
NON-WROST CASE	120.01	60	0.195	23.4	0.998

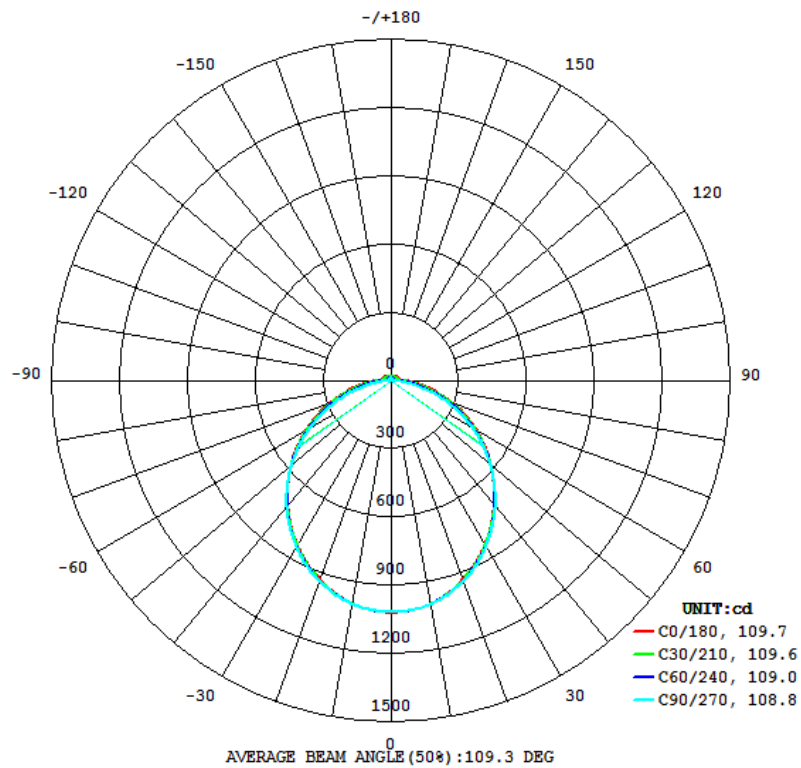
Test Result

Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
3001	168.7	158.9	109.7	108.8	128.2

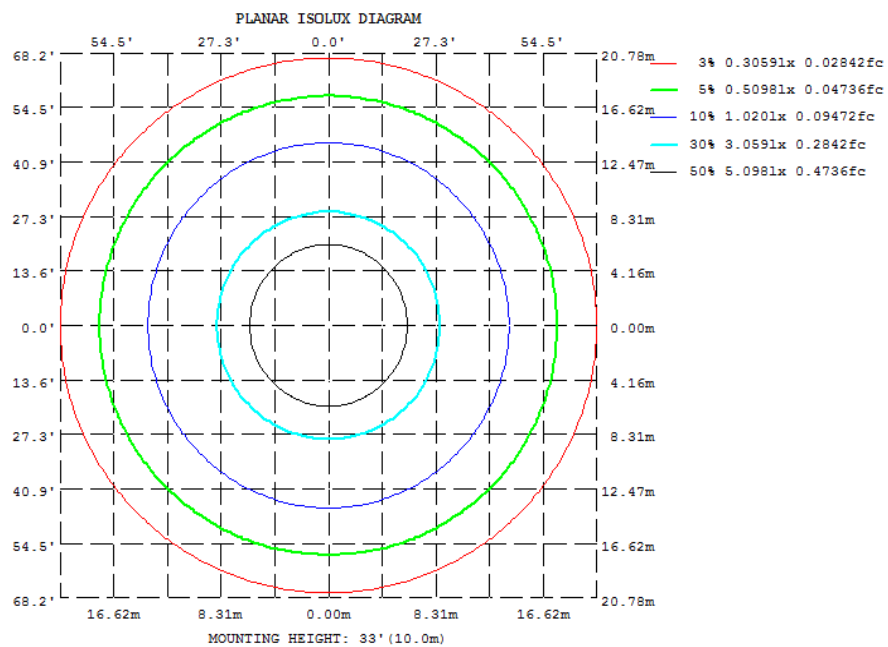
Zonal Lumen Requirement (0° - 60°)	UGR (X=4H, Y=8H, 70/50/20%)	Length(ft)	Lumen/ft
73.93%	23.7	2.00	1500

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	996.5	996.8	997.5	996.8	996.5	996.8	997.5	996.8
20	931.0	934.2	937.2	934.2	931.0	934.2	937.2	934.2
30	833.3	837.4	842.0	837.4	833.3	837.4	842.0	837.4
40	713.3	715.8	719.8	715.8	713.3	715.8	719.8	715.8
50	579.0	577.7	577.2	577.7	579.0	577.7	577.2	577.7
60	435.7	428.7	419.6	428.7	435.7	428.7	419.6	428.7
70	290.2	274.9	253.6	274.9	290.2	274.9	253.6	274.9
80	153.6	130.4	94.20	130.4	153.6	130.4	94.20	130.4
90	56.02	33.25	0.1383	33.25	56.02	33.25	0.1383	33.25
100	45.48	27.41	1.172	27.41	45.48	27.41	1.172	27.41
110	42.00	26.19	3.940	26.19	42.00	26.19	3.940	26.19
120	38.53	25.04	7.214	25.04	38.53	25.04	7.214	25.04
130	34.43	23.63	10.52	23.63	34.43	23.63	10.52	23.63
140	29.92	22.35	13.46	22.35	29.92	22.35	13.46	22.35
150	25.84	20.69	15.87	20.69	25.84	20.69	15.87	20.69
160	21.92	19.12	17.11	19.12	21.92	19.12	17.11	19.12
170	18.76	15.86	13.15	15.86	18.76	15.86	13.15	15.86
180	4.839	9.970	11.19	9.970	4.839	9.970	11.19	9.970
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 Y=2H	UGR Viewed Crosswise					UGR Viewed Endwise					
3H	18.5	20.0	18.9	20.4	20.8	18.9	20.4	19.4	20.9	21.3	
4H	20.0	21.4	20.5	21.8	22.3	20.8	22.2	21.3	22.7	23.1	
6H	20.5	21.8	21.0	22.3	22.8	21.6	22.9	22.1	23.4	23.9	
8H	20.8	22.1	21.3	22.5	23.0	22.3	23.5	22.8	24.0	24.5	
12H	20.9	22.1	21.4	22.5	23.1	22.6	23.7	23.1	24.2	24.7	
	20.9	22.0	21.4	22.5	23.0	22.8	23.9	23.3	24.4	24.9	
4H 2H	19.1	20.4	19.6	20.8	21.3	19.5	20.8	19.9	21.2	21.7	
3H	20.9	22.0	21.4	22.5	23.0	21.6	22.7	22.1	23.2	23.7	
4H	21.5	22.5	22.0	23.0	23.6	22.5	23.5	23.0	24.0	24.6	
6H	21.9	22.8	22.4	23.3	23.9	23.3	24.2	23.9	24.7	25.3	
8H	22.0	22.8	22.5	23.3	23.9	23.7	24.5	24.2	25.0	25.6	
12H	22.0	22.8	22.6	23.3	23.9	24.0	24.7	24.5	25.3	25.8	
8H 4H	21.9	22.7	22.4	23.2	23.8	22.7	23.6	23.3	24.1	24.7	
6H	22.3	23.0	22.9	23.6	24.2	23.7	24.4	24.2	24.9	25.5	
8H	22.5	23.1	23.1	23.7	24.3	24.1	24.7	24.7	25.3	25.9	
12H	22.6	23.1	23.1	23.7	24.4	24.5	25.1	25.1	25.6	26.3	
12H 4H	21.9	22.6	22.5	23.2	23.8	22.8	23.5	23.3	24.0	24.6	
6H	22.5	23.1	23.1	23.6	24.3	23.7	24.3	24.3	24.9	25.5	
8H	22.6	23.2	23.2	23.8	24.4	24.2	24.7	24.7	25.3	26.0	
Maximum UGR = 26.3											

4.2 Goniophotometer Test

ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	96.20	0 - 10	96.20	3.21%
10-20	273.67	0 - 20	369.87	12.33%
20-30	409.93	0 - 30	779.80	25.99%
30-40	487.67	0 - 40	1267.47	42.24%
40-50	500.47	0 - 50	1767.94	58.92%
50-60	450.59	0 - 60	2218.53	73.93%
60-70	347.22	0 - 70	2565.75	85.51%
70-80	209.56	0 - 80	2775.31	92.49%
80-90	77.60	0 - 90	2852.91	95.08%
90-100	29.50	0 - 100	2882.41	96.06%
100-110	26.62	0 - 110	2909.03	96.95%
110-120	24.23	0 - 120	2933.26	97.75%
120-130	21.12	0 - 130	2954.38	98.46%
130-140	17.39	0 - 140	2971.77	99.04%
140-150	13.30	0 - 150	2985.07	99.48%
150-160	9.24	0 - 160	2994.31	99.79%
160-170	5.08	0 - 170	2999.39	99.96%
170-180	1.30	0 - 180	3000.69	100.00%

4.2 Goniophotometer Test

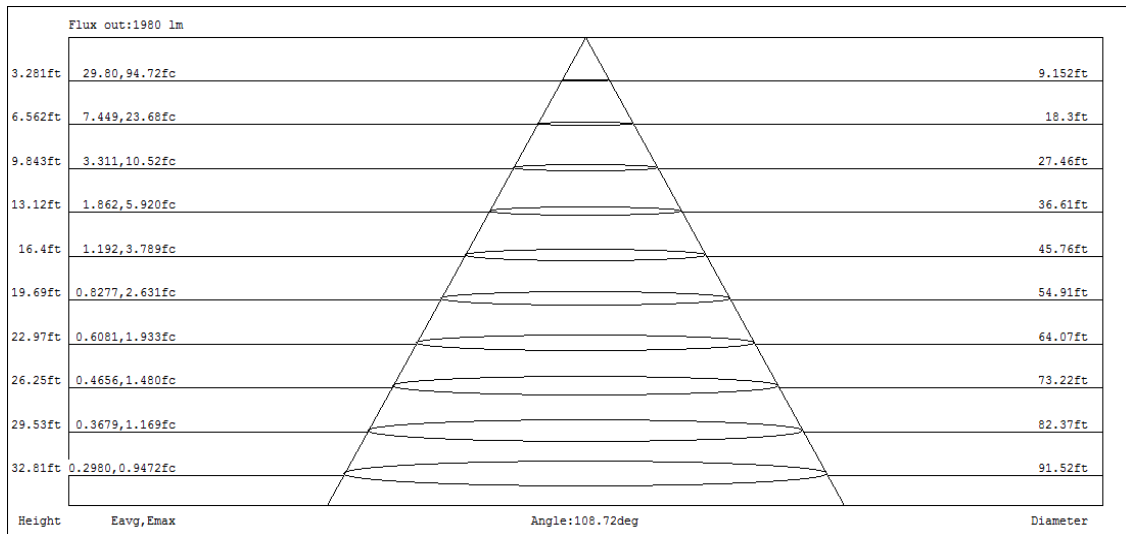
COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

Coefficients Of Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance 0.20

RC	80				70				50			30			10			0
RW	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	98	98	98	95
1	107	102	98	94	104	100	96	92	94	91	88	90	87	85	85	83	81	79
2	97	89	82	76	94	87	80	75	82	77	73	78	74	70	75	71	68	65
3	89	78	70	63	86	76	69	62	72	66	61	69	64	59	66	61	57	55
4	81	69	60	54	79	68	59	53	64	57	52	61	55	50	59	54	49	47
5	75	62	53	46	72	60	52	46	58	50	45	55	49	44	53	47	43	41
6	69	56	47	40	67	54	46	40	52	45	39	50	43	38	48	42	38	36
7	64	50	42	36	62	49	41	35	47	40	35	46	39	34	44	38	33	31
8	60	46	38	32	58	45	37	31	43	36	31	42	35	30	40	34	30	28
9	56	42	34	28	54	41	34	28	40	33	28	38	32	27	37	31	27	25
10	52	39	31	26	51	38	31	26	37	30	25	36	29	25	34	29	25	23

CONE OF LIGHT DIAGRAM



4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	CW2/22W/5000K	Sample ID.	H1
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	0.195	23.4	0.998	1.26%
276.94	60	0.087	23.4	0.968	8.99%

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*****