

Photometric Test Report

Relevant Standards

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

Prepared For

RAB Lighting Inc.

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Project Number

DLF2212110

Report Number

DLF2212110-12a

Test Date

2023/1/3

Issue Date

2023/1/5

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	1500		3042
Lumen/ft (Goniophotometer - Section 4.2)	IES LM-79-2008	≥375		761
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 115	Premium 130	144.9
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		21.0
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	6.18%
		20.00%	277V	12.32%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.989
		0.9	277V	0.896
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	5029±355	4918
		4 step	5029±220	
Minimum CRI (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥80		83
Minimum R9 (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥0		7
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		93
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%		71.77%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<22		21.3
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		0.085
(Goniophotometer - Section 4.2)		Non-Wrost Case		0.165
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		21.0
(Goniophotometer - Section 4.2)		Non-Wrost Case		19.5

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023/1/3	GUSJR4/20W/5000K	L1
2	Goniophotometer Test	2023/1/3	GUSJR4/20W/5000K	L1
3	THD and PF Test	2023/1/3	GUSJR4/20W/5000K	L1

Remark(If any)

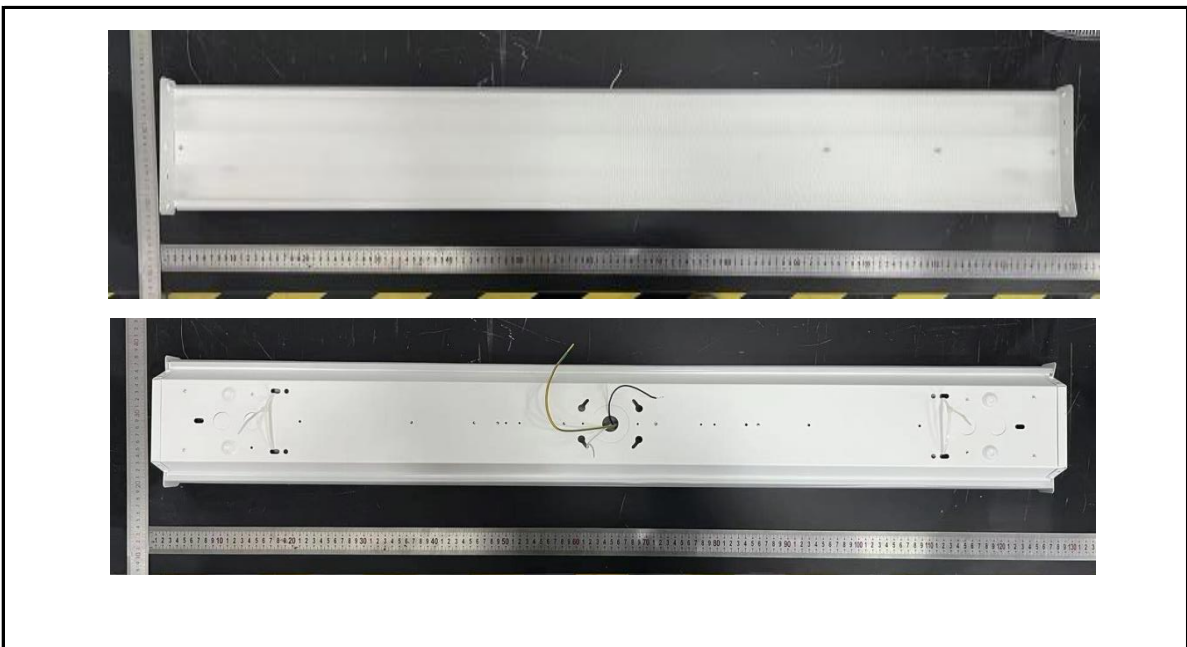
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3.0 Production Description

Luminaire Description: GUSJR4/20W/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.	GUSJR4/20W/5000K	Sample ID.	L1
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
120.02	60	0.163	19.3	0.989
276.96	60	0.084	20.8	0.896

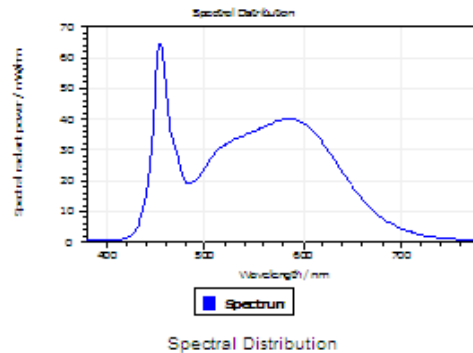
Test Result

CCT (K)	CRI	R9	Duv
4918	83	7	0.004

Rf	Rg	IES Rcs,h1
83	93	-13%

4.1 Integrating Sphere Test

Results

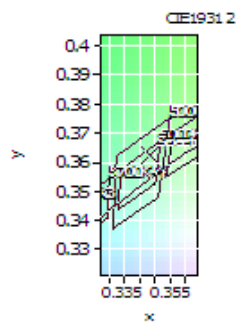


Spectral values

DominantWavelength 570.44 nm
Purity 0.133
PeakWavelength 454.64 nm
Radiant Power 7.705 W
Width50%:

Color Coordinates

Correlated Color Temperat 4918 K
x: 0.3484 u: 0.2096 u': 0.2096
y: 0.3622 v: 0.3268 v': 0.4902
CRI01 81.2 CRI09 6.6
CRI02 91.3 CRI10 78.6
CRI03 95.3 CRI11 77.9
CRI04 78.8 CRI12 55.8
CRI05 80.9 CRI13 84.4
CRI06 86.9 CRI14 97.9
CRI07 85.5 CRI15 74.5
CRI08 84.9 CRI16 69.4
ResultsCRI 83.1



PlanckDistance 4.0E-003

4.1 Integrating Sphere Test

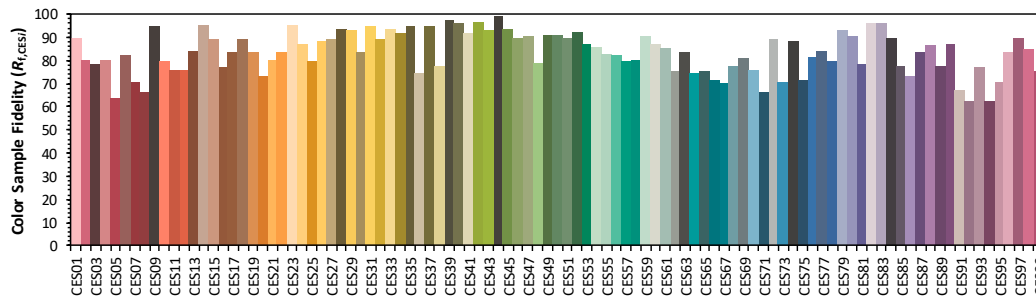
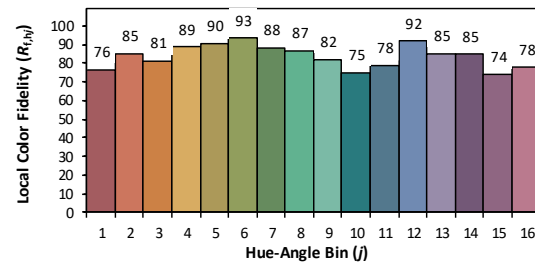
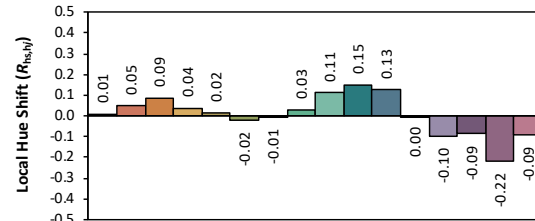
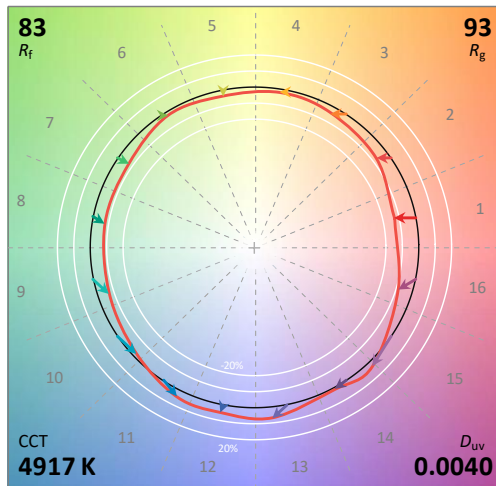
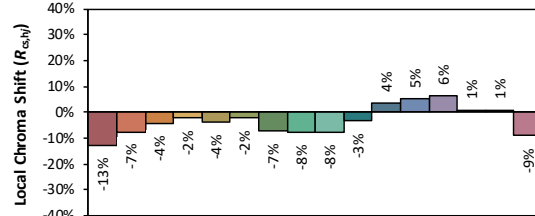
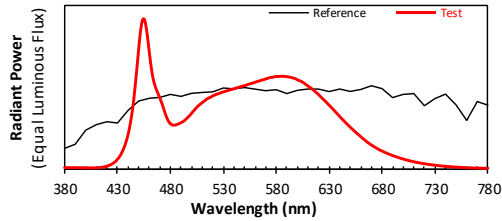
IES TM-30-18 Color Rendition Report

Source: DLF2212110-12a

Manufacturer: RAB Lighting Inc.

Date: 2023/1/3

Model: GUSJR4/20W/5000K



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

x 0.3484
 y 0.3622
 u' 0.2096
 v' 0.4902

CIE 13.3-1995
(CRI)

R_a 84
 R_g 12

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	GUSJR4/20W/5000K	Sample ID.	L1
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	276.97	60	0.085	21.0	0.891
NON-WROST CASE	120.01	60	0.165	19.5	0.984

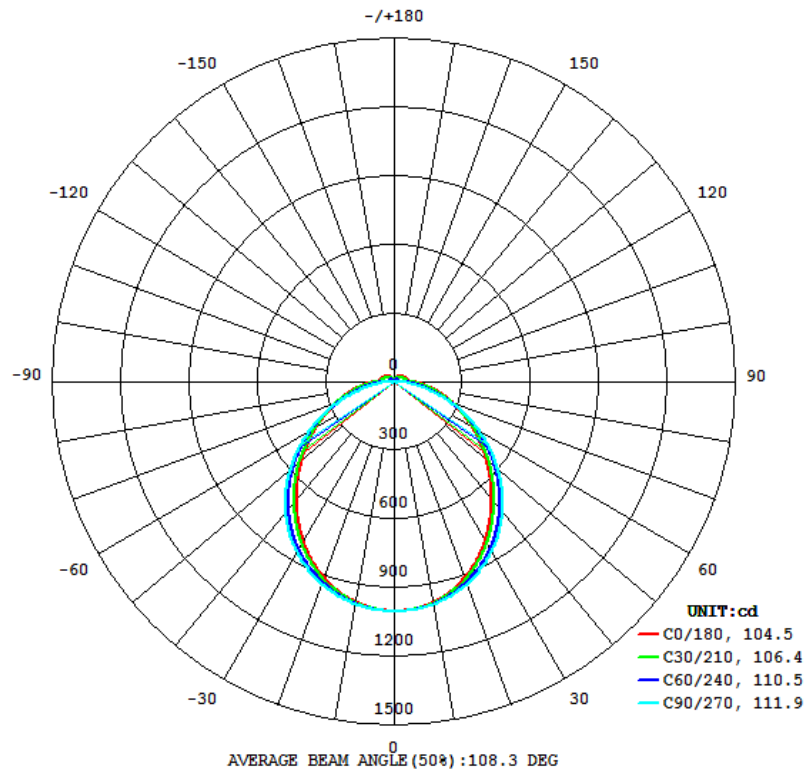
Test Result

Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
3042	174.9	161.1	104.5	111.9	144.9

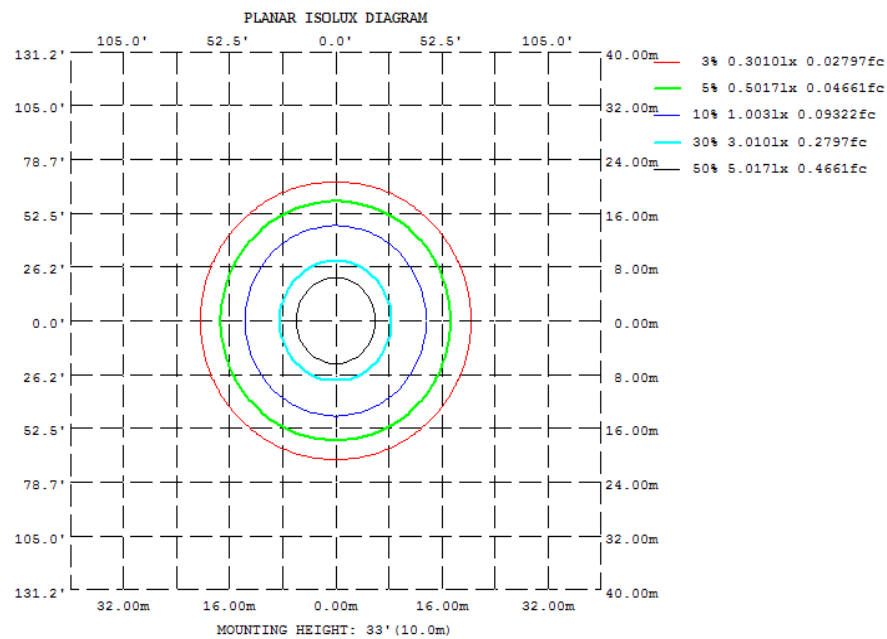
Zonal Lumen Requirement (0°-60°)	UGR (X=4H, Y=8H, 70/50/20%)	Length(ft)	Lumen/ft
71.77%	21.3	4.00	761

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	979.2	982.7	987.0	982.7	979.2	982.7	987.0	982.7
20	910.5	924.8	938.7	924.8	910.5	924.8	938.7	924.8
30	801.1	829.8	857.5	829.8	801.1	829.8	857.5	829.8
40	669.4	705.3	743.6	705.3	669.4	705.3	743.6	705.3
50	532.2	563.5	598.4	563.5	532.2	563.5	598.4	563.5
60	398.5	416.4	433.4	416.4	398.5	416.4	433.4	416.4
70	277.7	276.0	264.2	276.0	277.7	276.0	264.2	276.0
80	172.3	152.0	107.6	152.0	172.3	152.0	107.6	152.0
90	82.28	57.57	1.538	57.57	82.28	57.57	1.538	57.57
100	69.07	47.92	1.460	47.92	69.07	47.92	1.460	47.92
110	59.94	42.07	2.865	42.07	59.94	42.07	2.865	42.07
120	51.61	36.28	4.262	36.28	51.61	36.28	4.262	36.28
130	43.47	31.20	5.505	31.20	43.47	31.20	5.505	31.20
140	36.24	25.87	6.518	25.87	36.24	25.87	6.518	25.87
150	28.10	19.89	6.811	19.89	28.10	19.89	6.811	19.89
160	19.47	13.59	6.559	13.59	19.47	13.59	6.559	13.59
170	11.16	8.382	5.990	8.382	11.16	8.382	5.990	8.382
180	5.744	6.522	6.665	6.522	5.744	6.522	6.665	6.522
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	16.0	17.4	16.4	17.9	18.4	15.8	17.3	16.3	17.8	18.3
	3H	17.5	18.9	18.0	19.4	19.9	17.9	19.2	18.4	19.7	20.2
	4H	18.1	19.3	18.6	19.8	20.4	18.8	20.1	19.3	20.5	21.1
	6H	18.4	19.6	18.9	20.1	20.6	19.7	20.8	20.2	21.3	21.9
	8H	18.5	19.6	19.0	20.1	20.7	20.1	21.2	20.6	21.7	22.3
	12H	18.5	19.6	19.1	20.1	20.7	20.5	21.6	21.0	22.1	22.7
4H	2H	16.5	17.8	17.0	18.3	18.8	16.4	17.7	17.0	18.2	18.7
	3H	18.3	19.4	18.9	20.0	20.5	18.7	19.8	19.2	20.3	20.8
	4H	19.0	20.0	19.6	20.5	21.1	19.7	20.7	20.3	21.3	21.8
	6H	19.5	20.3	20.0	20.9	21.5	20.8	21.6	21.3	22.2	22.8
	8H	19.6	20.4	20.2	21.0	21.6	21.3	22.1	21.8	22.6	23.3
	12H	19.7	20.4	20.3	21.0	21.6	21.8	22.5	22.4	23.1	23.7
8H	4H	19.4	20.2	20.0	20.8	21.4	20.0	20.8	20.6	21.4	22.0
	6H	20.0	20.7	20.6	21.3	21.9	21.2	21.9	21.8	22.5	23.1
	8H	20.2	20.8	20.8	21.4	22.0	21.8	22.4	22.5	23.1	23.7
	12H	20.3	20.8	20.9	21.4	22.1	22.5	23.0	23.1	23.6	24.3
12H	4H	19.5	20.2	20.0	20.8	21.4	20.0	20.8	20.6	21.4	22.0
	6H	20.1	20.7	20.7	21.3	22.0	21.3	21.9	21.9	22.5	23.2
	8H	20.4	20.9	21.0	21.5	22.2	21.9	22.5	22.6	23.1	23.8
Maximum UGR = 24.3											

4.2 Goniophotometer Test

ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	94.77	0 - 10	94.77	3.12%
10-20	270.38	0 - 20	365.15	12.00%
20-30	405.89	0 - 30	771.04	25.35%
30-40	481.92	0 - 40	1252.96	41.19%
40-50	491.29	0 - 50	1744.25	57.34%
50-60	438.97	0 - 60	2183.22	71.77%
60-70	340.58	0 - 70	2523.80	82.97%
70-80	219.59	0 - 80	2743.39	90.18%
80-90	101.13	0 - 90	2844.52	93.51%
90-100	49.17	0 - 100	2893.69	95.12%
100-110	41.86	0 - 110	2935.55	96.50%
110-120	34.56	0 - 120	2970.11	97.64%
120-130	27.15	0 - 130	2997.26	98.53%
130-140	20.01	0 - 140	3017.27	99.19%
140-150	13.40	0 - 150	3030.67	99.63%
150-160	7.51	0 - 160	3038.18	99.87%
160-170	3.12	0 - 170	3041.30	99.98%
170-180	0.70	0 - 180	3042.00	100.00%

4.2 Goniophotometer Test

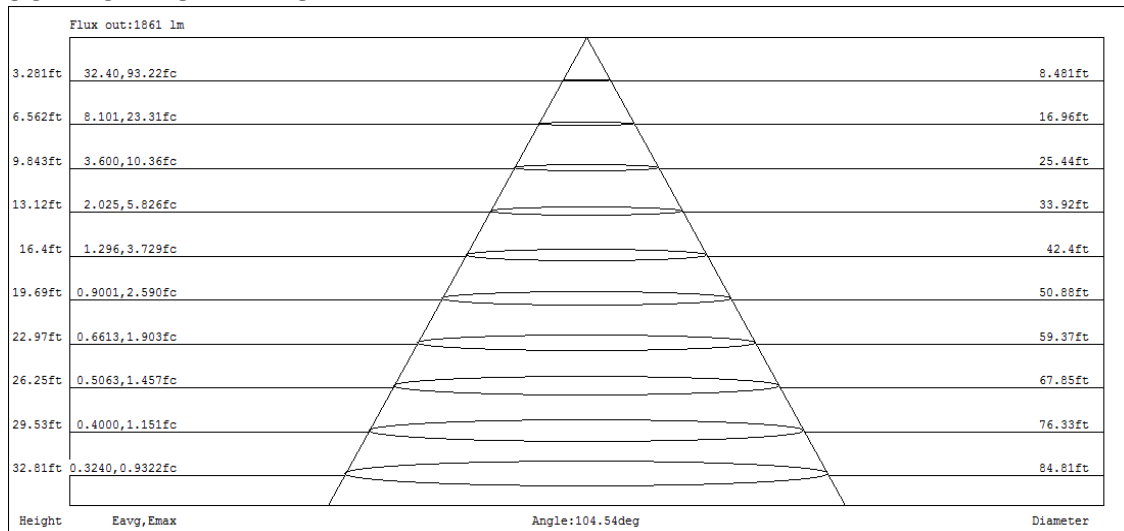
COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

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	114	114	114	114	108	108	108	102	102	102	96	96	96	94
1	107	102	97	93	103	99	95	91	93	90	87	88	85	83	84	81	79	77
2	97	88	81	75	93	86	79	74	81	76	71	77	73	69	73	69	66	64
3	88	77	69	63	85	75	68	62	71	65	60	68	62	58	64	60	56	54
4	81	69	60	53	78	67	59	52	63	56	51	60	54	49	57	52	48	46
5	74	61	52	46	72	60	51	45	57	50	44	54	48	43	52	46	42	39
6	68	55	46	40	66	54	45	39	51	44	38	49	43	38	47	41	37	35
7	64	50	41	35	61	49	41	35	47	39	34	45	38	33	43	37	33	31
8	59	46	37	31	57	45	37	31	43	36	30	41	35	30	39	34	29	27
9	55	42	34	28	53	41	33	28	39	32	27	38	31	27	36	31	26	25
10	52	39	31	25	50	38	30	25	36	30	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.	GUSJR4/20W/5000 K	Sample ID.	L1
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
120.02	60	0.163	19.3	0.989	6.18%
276.96	60	0.084	20.8	0.896	12.32%

5.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
DLF107	Integrating Sphere System	2022/12/26	2023/12/25
DLF108	Auxiliary Lamp	2022/12/26	2023/12/25
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-derectional	2022/12/26	2023/12/25
DLF116	AC Power Source	2022/12/26	2023/12/25
DLF113	Power Meter	2022/12/26	2023/12/25
DLF112	Temperature Recorder	2022/12/26	2023/12/25
DLF114	Temperature & Humidity Datalogger	2022/12/26	2023/12/25
DLF101	Goniophotometer	2022/12/26	2023/12/25
DLF125	Standard Lamp Standard Lamp Type: 76.58 V, 6.7875 A, Tungsten, Omni-derectional	2022/12/26	2023/12/25
DLF104	AC Power Source	2022/12/26	2023/12/25
DLF507	DC Power Source	2022/12/26	2023/12/25
DLF102	Power Meter	2022/12/26	2023/12/25
DLF111	Temperature & Humidity Datalogger	2022/12/26	2023/12/25
DLF119	Power Meter	2022/12/26	2023/12/25
DLF031	Temperature data logger	2022/12/26	2023/12/25
DLF022	Digital power meter	2022/12/26	2023/12/25
DLF003	Temperature & Humidity Datalogger	2022/12/26	2023/12/25

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