

# 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

**DLF2212110-9a**

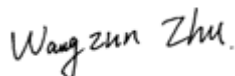
## Test Date

**2023/1/3**

## Issue Date

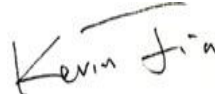
**2023/1/5**

### 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	750		2632
Lumen/ft (Goniophotometer - Section 4.2)	IES LM-79-2008	≥375		1316
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 115	Premium 130	130.3
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		20.2
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	6.38%
		20.00%	277V	7.20%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.996
		0.9	277V	0.976
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	5029±355	4961
		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		8
Minimum Rf (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥70		84
Minimum Rg (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥89		94
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	≥40%		72.07%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<22		23.2
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		0.169
(Goniophotometer - Section 4.2)		Non-Wrost Case		0.073
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		20.2
(Goniophotometer - Section 4.2)		Non-Wrost Case		19.8

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023/1/3	GUSJR2/20W/5000K	I1
2	Goniophotometer Test	2023/1/3	GUSJR2/20W/5000K	I1
3	THD and PF Test	2023/1/3	GUSJR2/20W/5000K	I1

### 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.

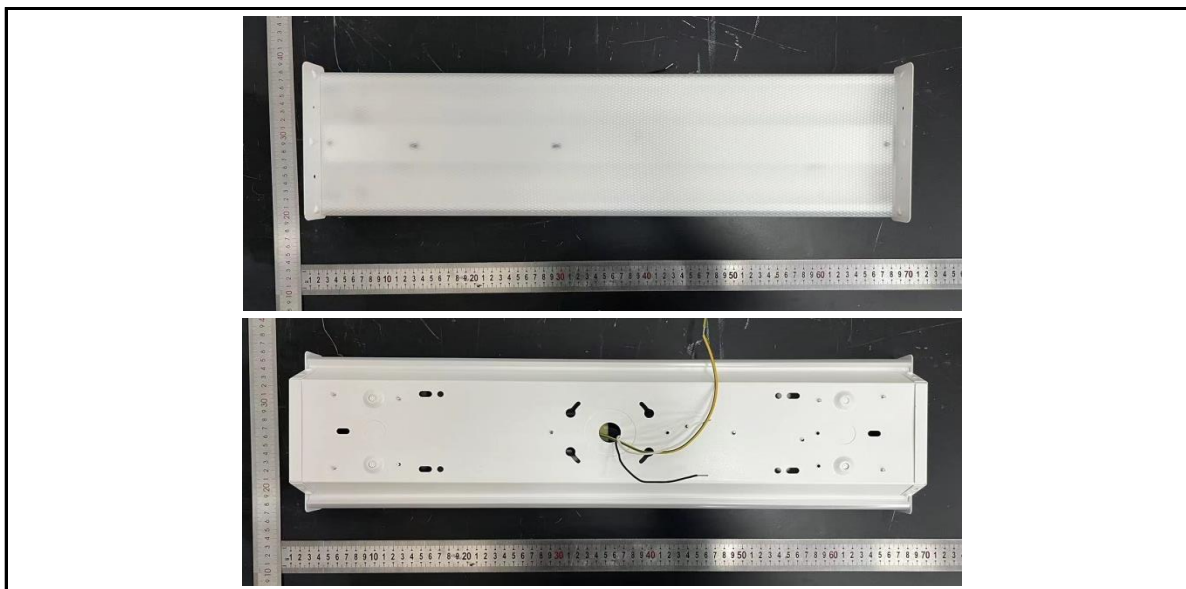
2、 The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing 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:** GUSJR2/20W/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.	GUSJR2/20W/5000K	Sample ID.	I1
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
120.00	60	0.166	19.9	0.996
276.97	60	0.072	19.5	0.976

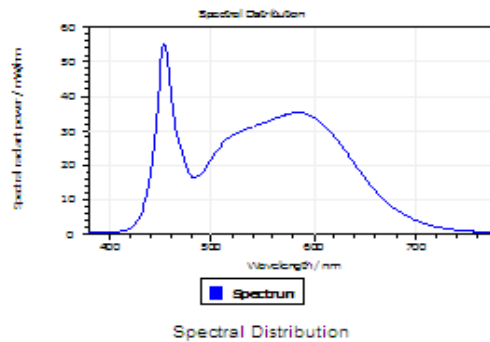
#### Test Result

CCT (K)	CRI	R9	Duv
4961	84	8	0.0041

Rf	Rg	IES Rcs,h1
84	94	-12%

## 4.1 Integrating Sphere Test

### Results

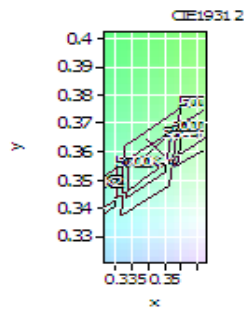


#### Spectral values

DominantWavelength 569.81 nm  
Purity 0.126  
PeakWavelength 453.83 nm  
Radiant Power 6.867 W  
Width50%:

#### Color Coordinates

Correlated Color Temperat 4961 K  
x: 0.3471 u: 0.2090 u': 0.2090  
y: 0.3614 v: 0.3264 v': 0.4897  
CRI01 81.9 CRI09 8.4  
CRI02 90.3 CRI10 76.5  
CRI03 95.1 CRI11 81.5  
CRI04 82.2 CRI12 61.6  
CRI05 82.4 CRI13 84.4  
CRI06 86.0 CRI14 97.7  
CRI07 86.8 CRI15 75.9  
CRI08 66.6 CRI16 72.8  
ResultsCRI 83.9



PlanckDistance 4.1E-003

## 4.1 Integrating Sphere Test

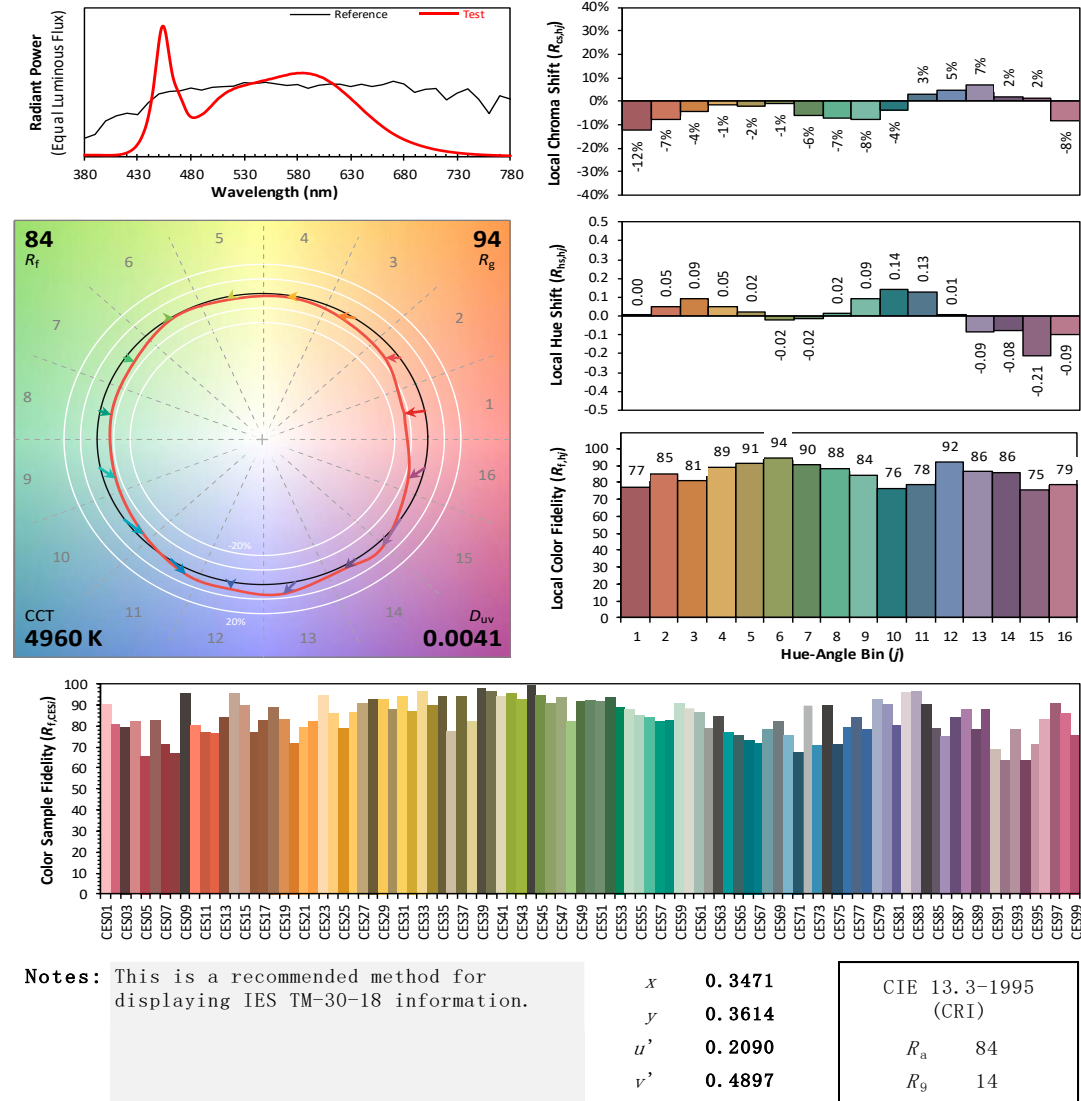
### IES TM-30-18 Color Rendition Report

Source: DLF2212110-9a

Manufacturer: RAB Lighting Inc.

Date: 2023/1/3

Model: GUSJR2/20W/5000K



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

## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

Model No.	GUSJR2/20W/5000K	Sample ID.	I1
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  $\pm 0.2$  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  $0.5^{\circ}$  vertical intervals and  $10^{\circ}$  horizontal intervals.

#### Test Conditions

Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
WROST CASE	119.97	60	0.169	20.2	0.995
NON-WROST CASE	277.02	60	0.073	19.8	0.975

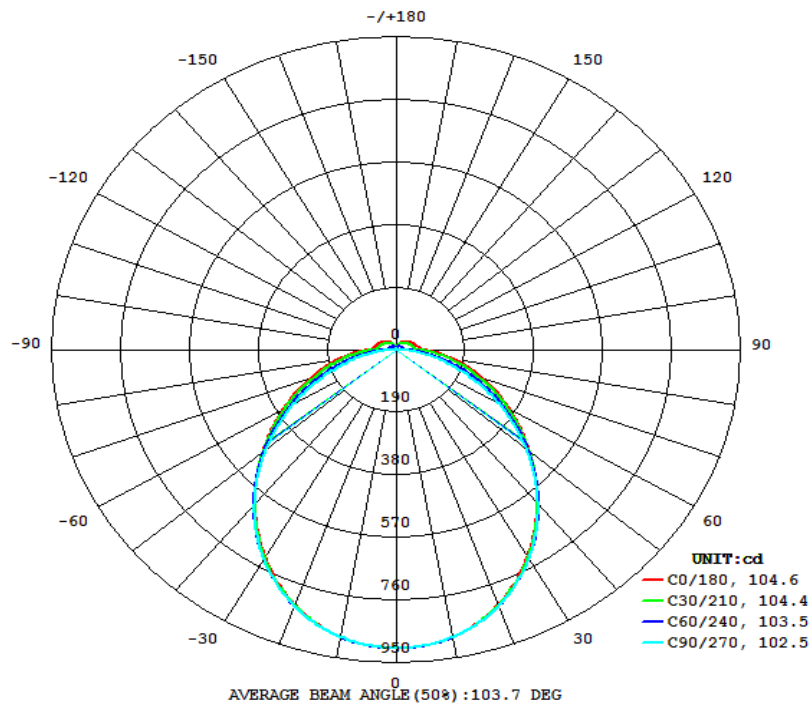
#### Test Result

Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
2632	175.7	158.1	104.6	102.5	130.3

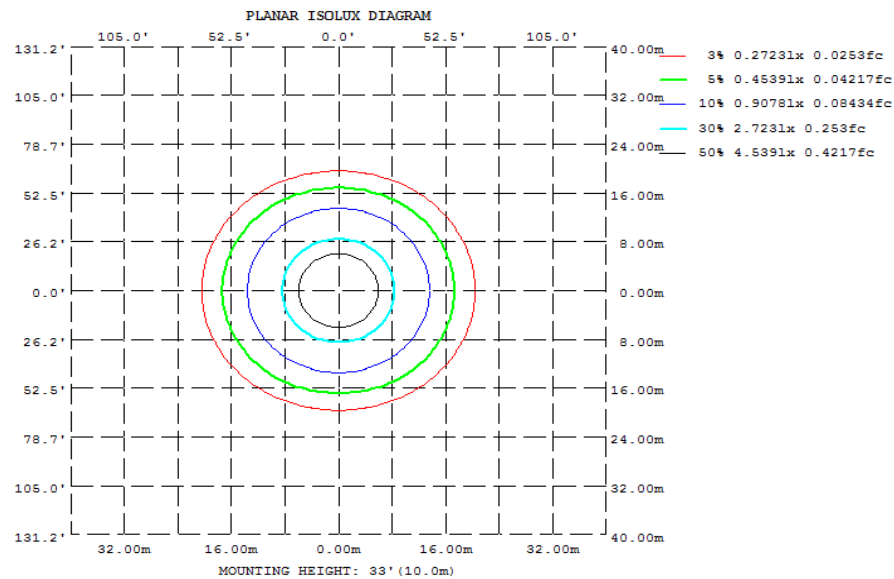
Zonal Lumen Requirement ( $0^{\circ}$ - $60^{\circ}$ )	UGR (X=4H, Y=8H, 70/50/20%)	Length(ft)	Lumen/ft
72.07%	23.2	2.00	1316

## 4.2 Goniophotometer Test

### Light Distribution Curve



### Isolux Plot





## 4.2 Goniophotometer Test

### Zonal Lumen Summary

γ	C0	C45	C90	C135	C180	C225	C270	C315
10	885.2	885.2	884.8	885.2	885.2	885.2	884.8	885.2
20	822.8	825.6	826.4	825.6	822.8	825.6	826.4	825.6
30	724.9	730.9	732.5	730.9	724.9	730.9	732.5	730.9
40	606.9	611.3	609.8	611.3	606.9	611.3	609.8	611.3
50	481.8	479.6	470.4	479.6	481.8	479.6	470.4	479.6
60	361.8	349.5	329.2	349.5	361.8	349.5	329.2	349.5
70	255.8	230.7	196.5	230.7	255.8	230.7	196.5	230.7
80	161.5	127.4	82.35	127.4	161.5	127.4	82.35	127.4
90	76.18	47.75	1.132	47.75	76.18	47.75	1.132	47.75
100	64.86	40.89	1.762	40.89	64.86	40.89	1.762	40.89
110	56.69	36.52	2.727	36.52	56.69	36.52	2.727	36.52
120	49.07	32.12	4.194	32.12	49.07	32.12	4.194	32.12
130	41.44	28.02	5.599	28.02	41.44	28.02	5.599	28.02
140	34.45	23.98	6.787	23.98	34.45	23.98	6.787	23.98
150	27.06	18.77	7.667	18.77	27.06	18.77	7.667	18.77
160	18.82	13.83	7.860	13.83	18.82	13.83	7.860	13.83
170	10.65	8.406	6.207	8.406	10.65	8.406	6.207	8.406
180	2.407	5.203	5.764	5.203	2.407	5.203	5.764	5.203
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	17.0	18.5	17.5	19.0	19.4	17.7	19.2	18.2	19.7	20.2
4H	18.5	19.8	19.0	20.3	20.8	19.8	21.1	20.3	21.6	22.1
6H	19.0	20.3	19.5	20.8	21.3	20.7	22.0	21.2	22.5	23.0
8H	19.3	20.5	19.9	21.0	21.6	21.6	22.8	22.2	23.3	23.9
12H	19.4	20.5	19.9	21.1	21.6	22.0	23.2	22.6	23.7	24.2
4H	19.5	20.5	20.0	21.0	21.6	22.4	23.5	23.0	24.0	24.6
2H	17.7	18.9	18.2	19.4	20.0	18.3	19.5	18.8	20.0	20.6
3H	19.4	20.5	19.9	21.0	21.6	20.6	21.6	21.1	22.1	22.7
4H	20.0	21.0	20.6	21.5	22.1	21.6	22.6	22.2	23.1	23.7
6H	20.5	21.3	21.0	21.9	22.5	22.7	23.5	23.3	24.1	24.7
8H	20.6	21.4	21.1	21.9	22.6	23.2	24.0	23.8	24.6	25.2
12H	20.6	21.4	21.2	22.0	22.6	23.7	24.4	24.3	25.0	25.6
4H	20.5	21.3	21.0	21.8	22.4	21.9	22.7	22.4	23.2	23.9
6H	21.0	21.7	21.6	22.3	22.9	23.1	23.8	23.7	24.4	25.0
8H	21.2	21.8	21.8	22.4	23.1	23.7	24.3	24.3	24.9	25.6
12H	21.3	21.9	21.9	22.5	23.2	24.3	24.9	25.0	25.5	26.2
4H	20.5	21.3	21.1	21.9	22.5	21.9	22.6	22.5	23.2	23.8
6H	21.2	21.8	21.8	22.4	23.1	23.1	23.7	23.8	24.3	25.0
8H	21.4	22.0	22.0	22.6	23.3	23.8	24.3	24.4	24.9	25.7
Maximum UGR = 26.2										

## 4.2 Goniophotometer Test

### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	85.48	0 - 10	85.48	3.25%
10-20	242.42	0 - 20	327.90	12.46%
20-30	359.72	0 - 30	687.62	26.13%
30-40	420.18	0 - 40	1107.80	42.10%
40-50	420.08	0 - 50	1527.88	58.06%
50-60	368.67	0 - 60	1896.55	72.07%
60-70	283.66	0 - 70	2180.21	82.85%
70-80	184.65	0 - 80	2364.86	89.86%
80-90	87.34	0 - 90	2452.20	93.18%
90-100	43.29	0 - 100	2495.49	94.83%
100-110	37.34	0 - 110	2532.83	96.25%
110-120	31.22	0 - 120	2564.05	97.43%
120-130	24.89	0 - 130	2588.94	98.38%
130-140	18.64	0 - 140	2607.58	99.09%
140-150	12.76	0 - 150	2620.34	99.57%
150-160	7.38	0 - 160	2627.72	99.85%
160-170	3.21	0 - 170	2630.93	99.97%
170-180	0.66	0 - 180	2631.59	100.00%

## 4.2 Goniophotometer Test

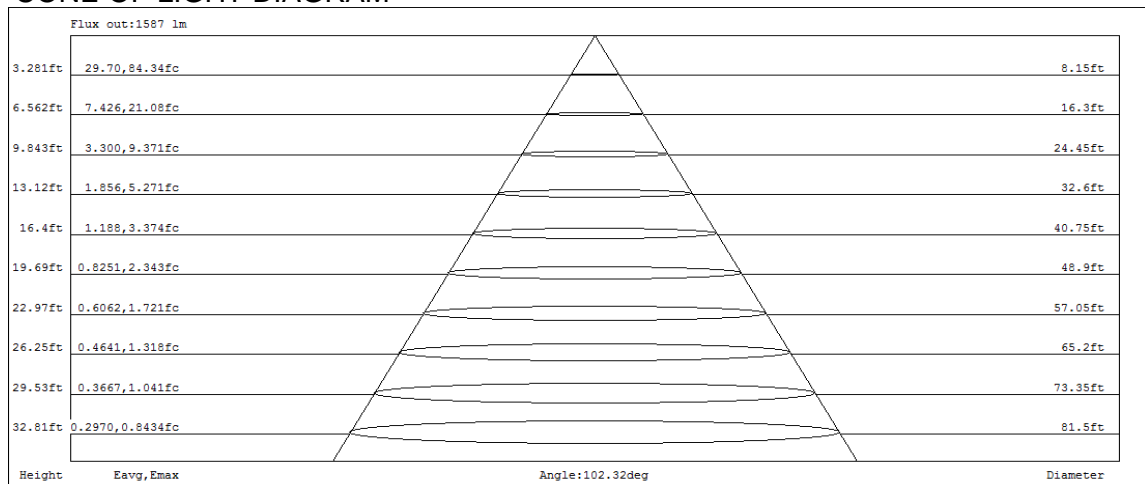
### COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

#### 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	117	117	117	117	114	114	114	114	107	107	107	101	101	101	96	96	96	93
1	107	102	97	93	103	99	95	91	93	90	87	88	85	83	83	81	79	77
2	97	88	82	76	94	86	80	74	81	76	72	77	73	69	73	70	66	64
3	88	78	70	63	85	76	68	62	72	65	60	68	63	58	65	60	56	54
4	81	69	60	53	78	67	59	53	64	57	51	61	55	50	58	53	48	46
5	74	62	53	46	72	60	52	46	57	50	44	55	48	43	52	47	42	40
6	69	56	47	40	66	54	46	40	52	44	39	49	43	38	47	42	37	35
7	64	50	42	36	62	49	41	35	47	40	35	45	39	34	43	38	33	31
8	59	46	38	32	58	45	37	32	43	36	31	41	35	30	40	34	30	28
9	56	42	34	29	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	35	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.	GUSJR2/20W/5000 K	Sample ID.	I1
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° C ± 1° 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	0.166	19.9	0.996	6.38%
276.97	60	0.072	19.5	0.976	7.20%

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