

Photometric Test Report

Relevant Standards

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

Prepared For

RAB Lighting Inc.

Room 6A33, No.1388, Wuzhong road, Shanghai, China

Xiao Xiang, 15921313292, Gary.Xiao@rabweb.com

Prepared By

Deliver Co., Ltd.

Block 11, 78 Keling Road, SSTP, Suzhou, China

0512-66801950, kevin.jia@szdeliver.com

Project Number

DLF2207110

Report Number

DLF2207110-1a

Test Date

2022/7/30

Issue Date

2022/7/31

Prepared By



Wangzun Zhu

Approved By



Kevin Jia

The results contained in this report pertain only to the tested sample.

This report shall not be reproduced, except in full, without written approval of Deliver Co., Ltd.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP.

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		1540
Lumen/ft (Goniophotometer - Section 4.2)	IES LM-79-2008	≥375		770
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 115	Premium 130	122.3
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		12.6
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	7.86%
		20.00%	277V	6.35%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.996
		0.9	277V	0.938
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	3045±175	2905
		4 step	3045±100	
Minimum CRI (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥80		82
Minimum R9 (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥0		2
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		96
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%		48.82%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<22		22.0
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		0.049
(Goniophotometer - Section 4.2)		Non-Wrost Case		0.097
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		12.6
(Goniophotometer - Section 4.2)		Non-Wrost Case		11.6

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2022/7/30	TOMO-2/12W/3000K	A1
2	Goniophotometer Test	2022/7/30	TOMO-2/12W/3000K	A1
3	THD and PF Test	2022/7/30	TOMO-2/12W/3000K	A1

Remark(If any)

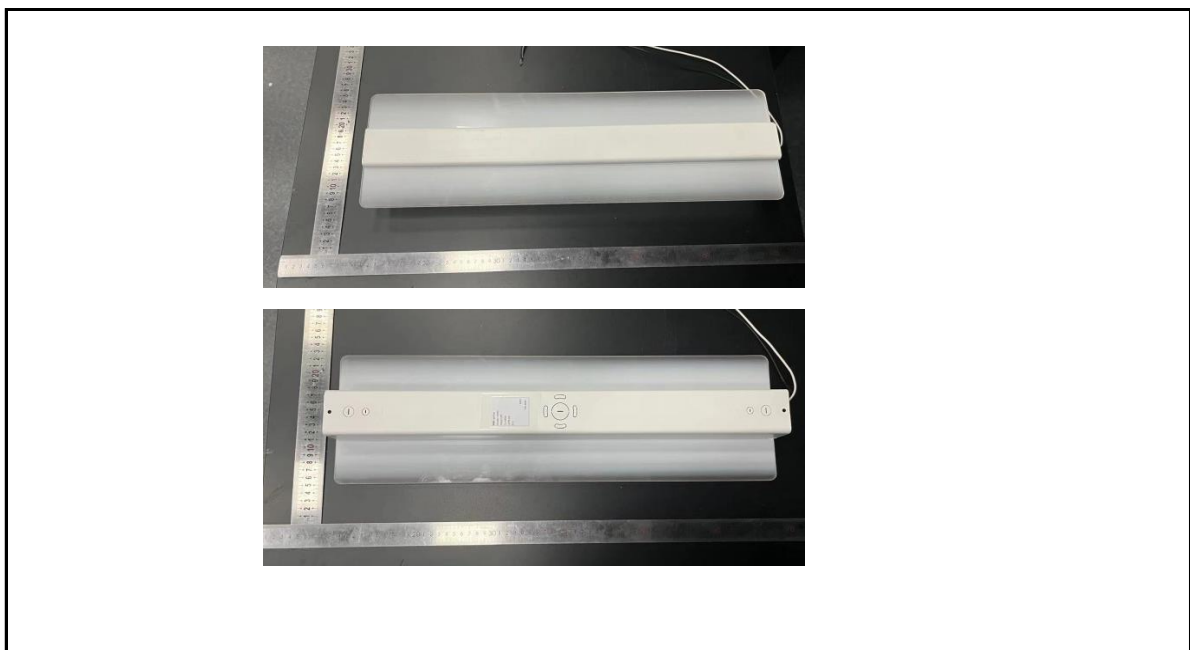
- 1、 This report shall not be used by the client to claim product endorsement by NVLAP, NIST or any agency of the US government.
- 2、 The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without 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: TOMO-2/12W/3000K

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.	TOMO-2/12W/3000K	Sample ID.	A1
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	0.098	11.7	0.996
277.02	60	0.048	12.6	0.938

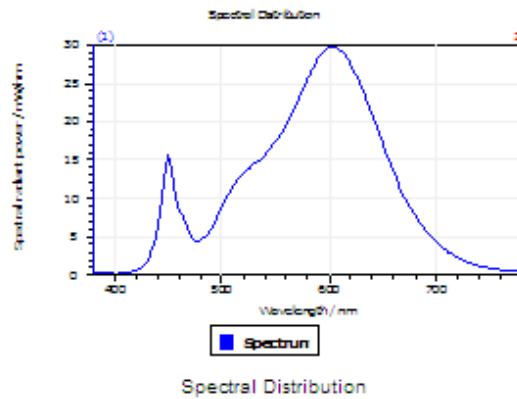
Test Result

CCT (K)	CRI	R9	Duv
2905	82	2	0.00063

Rf	Rg	IES Rcs,h1
84	96	-12%

4.1 Integrating Sphere Test

Results

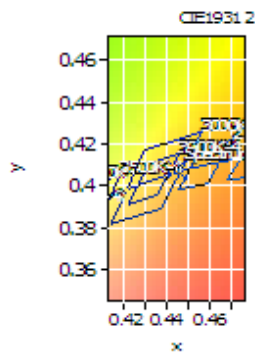


Spectral values

DominantWavelength 583.02 nm
Purity 0.561
PeakWavelength 603.26 nm
Radiant Power 4.267 W
Width50%:

Color Coordinates

Correlated Color Temperatur 2905 K
x: 0.4448 u: 0.2539 u': 0.2539
y: 0.4082 v: 0.3495 v': 0.5242
CRI01 79.7 CRI09 1.8
CRI02 90.1 CRI10 77.8
CRI03 96.2 CRI11 79.1
CRI04 79.4 CRI12 69.8
CRI05 79.6 CRI13 82.1
CRI06 88.1 CRI14 98.6
CRI07 82.1 CRI15 71.5
CRI08 66.6 CRI16 69.1
ResultsCRI 81.5



PlankDistance 6.3E-004

4.1 Integrating Sphere Test

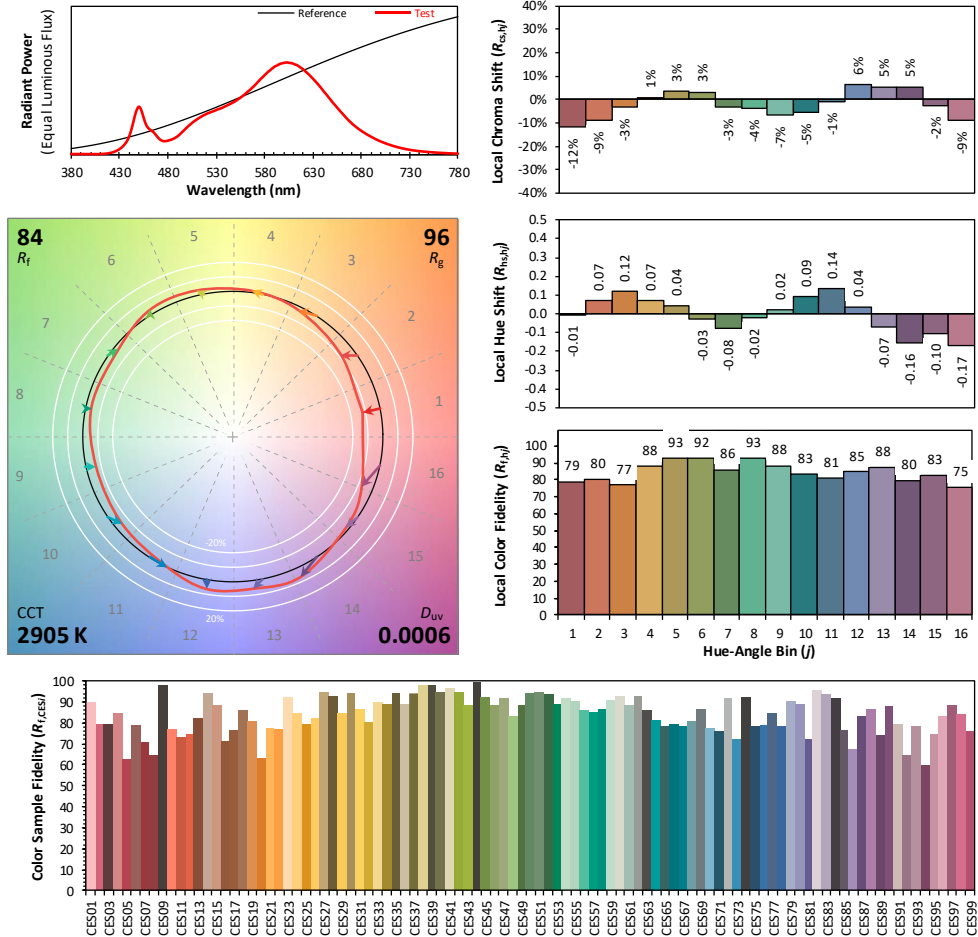
IES TM-30-18 Color Rendition Report

Source: DLF2207110-1a

Manufacturer: RAB Lighting Inc.

Date: 2022/7/30

Model: TOMO-2/12W/3000K



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

x 0.4448
 y 0.4082
 u' 0.2539
 v' 0.5242

CIE 13.3-1995
(CRI)

R_a 82
 R_g 2

lors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.0

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	TOMO-2/12W/3000K	Sample ID.	A1
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 $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, 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	277.08	60	0.049	12.6	0.935
NON-WROST CASE	120.07	60	0.097	11.6	0.997

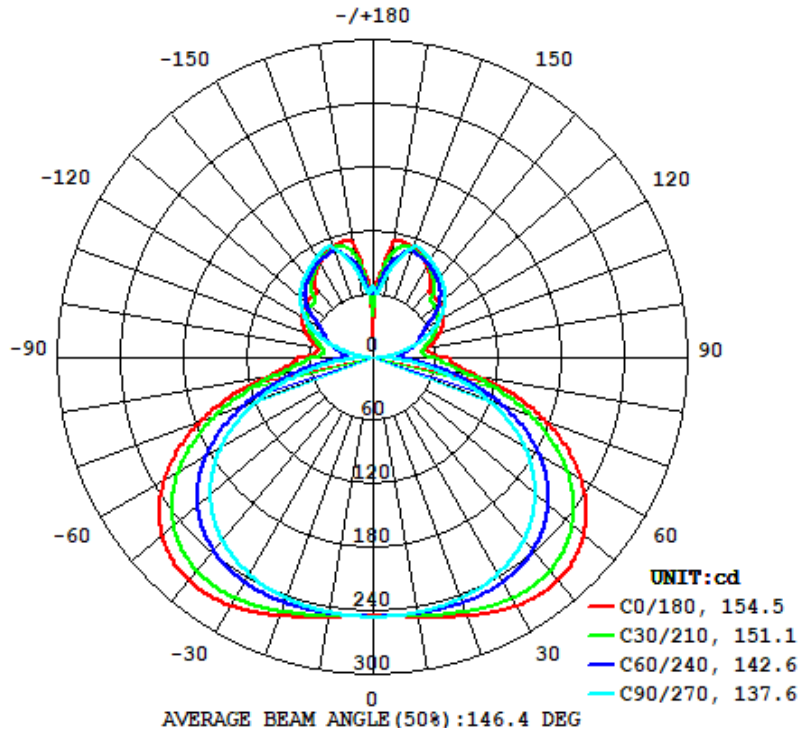
Test Result

Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
1540	358.3	360.0	154.5	137.6	122.3

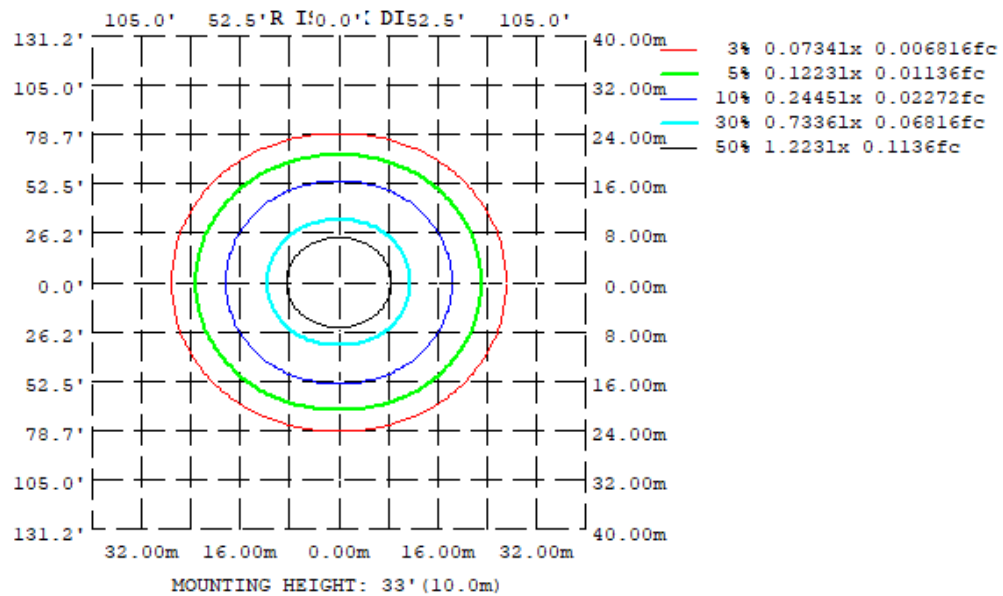
Zonal Lumen Requirement (0° - 60°)	UGR (X=4H, Y=8H, 70/50/20%)	Length(ft)	Lumen/ft
48.82%	22.0	2.00	770

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	249.0	246.9	244.9	246.9	249.0	246.9	244.9	246.9
20	259.9	251.5	242.5	251.5	259.9	251.5	242.5	251.5
30	271.4	254.3	236.7	254.3	271.4	254.3	236.7	254.3
40	274.3	250.3	224.5	250.3	274.3	250.3	224.5	250.3
50	261.9	233.1	202.1	233.1	261.9	233.1	202.1	233.1
60	229.1	198.3	166.9	198.3	229.1	198.3	166.9	198.3
70	174.0	145.4	115.9	145.4	174.0	145.4	115.9	145.4
80	100.8	81.83	54.17	81.83	100.8	81.83	54.17	81.83
90	69.99	43.45	3.780	43.45	69.99	43.45	3.780	43.45
100	53.29	41.19	19.92	41.19	53.29	41.19	19.92	41.19
110	67.80	54.07	49.23	54.07	67.80	54.07	49.23	54.07
120	78.94	65.55	74.51	65.55	78.94	65.55	74.51	65.55
130	83.14	73.97	90.66	73.97	83.14	73.97	90.66	73.97
140	86.21	94.90	101.1	94.90	86.21	94.90	101.1	94.90
150	103.2	105.0	109.2	105.0	103.2	105.0	109.2	105.0
160	112.2	110.4	110.8	110.4	112.2	110.4	110.8	110.4
170	110.2	92.53	81.24	92.53	110.2	92.53	81.24	92.53
180	20.58	52.70	67.18	52.70	20.58	52.70	67.18	52.70
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	14.1	15.3	14.8	16.1	17.0	15.7	17.0	16.5	17.7	18.6	
4H	16.2	17.3	17.0	18.1	19.0	18.3	19.4	19.0	20.1	21.1	
6H	17.0	18.1	17.8	18.9	19.8	19.3	20.4	20.1	21.2	22.1	
8H	17.7	18.6	18.4	19.4	20.4	20.3	21.3	21.1	22.0	23.0	
12H	17.9	18.8	18.7	19.6	20.6	20.7	21.7	21.5	22.5	23.4	
4H 2H	18.0	18.9	18.8	19.7	20.7	21.2	22.1	22.0	22.9	23.9	
3H	15.1	16.2	15.9	16.9	17.9	16.3	17.4	17.1	18.2	19.1	
4H	17.4	18.3	18.2	19.1	20.1	19.1	20.0	19.9	20.8	21.8	
6H	18.3	19.2	19.1	20.0	21.0	20.3	21.1	21.1	22.0	23.0	
8H	19.1	19.8	19.9	20.7	21.7	21.5	22.2	22.3	23.0	24.0	
12H	19.3	20.0	20.2	20.9	21.9	22.0	22.7	22.8	23.5	24.5	
4H 4H	19.5	20.1	20.3	21.0	22.0	22.6	23.3	23.5	24.1	25.1	
6H 4H	19.0	19.6	19.8	20.5	21.5	20.6	21.3	21.5	22.1	23.2	
8H 4H	19.9	20.5	20.7	21.3	22.4	22.0	22.5	22.8	23.4	24.4	
12H 4H	20.3	20.8	21.1	21.6	22.7	22.7	23.2	23.5	24.1	25.1	
4H 6H	20.5	21.0	21.4	21.8	22.9	23.5	24.0	24.4	24.8	25.9	
6H 6H	19.1	19.7	19.9	20.6	21.6	20.7	21.3	21.5	22.1	23.1	
8H 6H	20.1	20.6	21.0	21.5	22.6	22.1	22.6	22.9	23.4	24.5	
12H 6H	20.6	21.0	21.4	21.9	23.0	22.8	23.3	23.7	24.2	25.2	

Maximum UGR = 25.9

4.2 Goniophotometer Test

ZONAL LUMEN SUMMARY

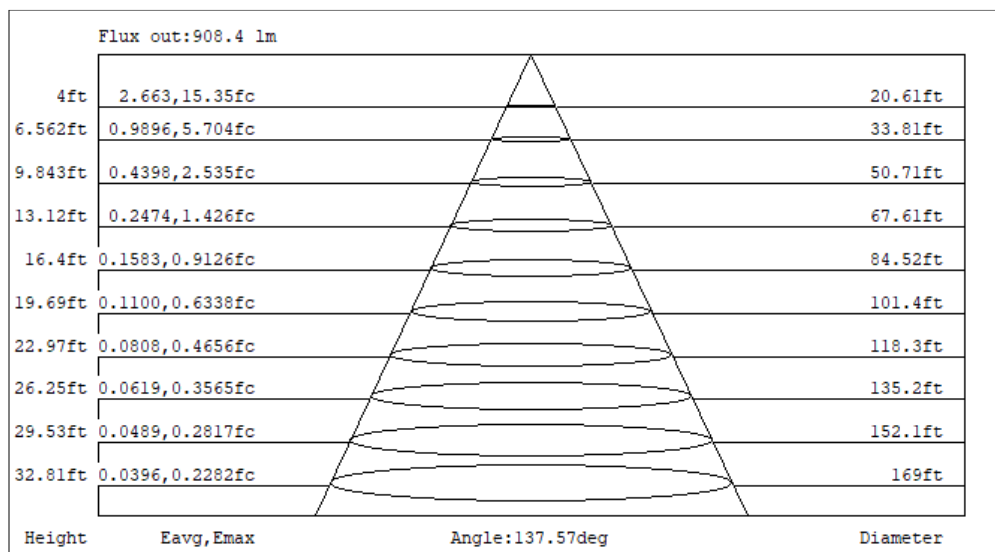
	Zonal (lm)		Total (lm)	Percent
0-10	23.48	0 - 10	23.48	1.52%
10-20	70.69	0 - 20	94.17	6.11%
20-30	117.20	0 - 30	211.37	13.72%
30-40	158.76	0 - 40	370.13	24.03%
40-50	187.60	0 - 50	557.73	36.21%
50-60	194.32	0 - 60	752.05	48.82%
60-70	171.61	0 - 70	923.66	59.96%
70-80	118.79	0 - 80	1042.45	67.67%
80-90	60.59	0 - 90	1103.04	71.60%
90-100	40.48	0 - 100	1143.52	74.23%
100-110	48.81	0 - 110	1192.33	77.40%
110-120	62.42	0 - 120	1254.75	81.45%
120-130	68.66	0 - 130	1323.41	85.91%
130-140	67.54	0 - 140	1390.95	90.29%
140-150	62.45	0 - 150	1453.40	94.35%
150-160	49.85	0 - 160	1503.25	97.58%
160-170	29.78	0 - 170	1533.03	99.52%
170-180	7.44	0 - 180	1540.47	100.00%

4.2 Goniophotometer Test

COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

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	112	112	112	112	106	106	106	106	95	95	95	85	85	85	76	76	76	72
1	101	95	90	86	95	90	86	82	81	77	74	72	69	67	64	62	60	56
2	90	82	74	68	85	77	71	65	69	64	59	62	57	54	55	51	48	45
3	82	71	62	55	77	67	59	53	60	54	48	53	48	44	47	43	40	36
4	74	62	53	46	70	59	50	44	52	46	40	47	41	37	41	37	33	30
5	68	55	45	39	64	52	43	37	46	39	34	41	36	31	37	32	28	25
6	62	49	40	33	58	46	38	32	42	34	29	37	31	27	33	28	24	22
7	57	44	35	29	54	42	33	28	37	30	25	34	28	23	30	25	21	19
8	53	40	31	25	50	38	30	24	34	27	22	31	25	21	27	22	19	16
9	49	36	28	22	47	34	27	21	31	24	20	28	22	18	25	20	17	15
10	46	33	25	20	43	31	24	19	28	22	18	26	20	16	23	18	15	13

CONE OF LIGHT DIAGRAM



4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	TOMO-2/12W/3000K	Sample ID.	A1
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	0.098	11.7	0.996	7.86%
277.02	60	0.048	12.6	0.938	6.35%

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*****