

# Photometric Test Report

## Relevant Standards

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

## Prepared For

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## Project Number

**DLF2207108**

## Report Number

**DLF2207108-4a**

## Test Date

**2022/7/27**

## Issue Date

**2022/7/29**

### 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		6217
Lumen/ft (Goniophotometer - Section 4.2)	IES LM-79-2008	≥375		777
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 115	Premium 130	132.6
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		46.9
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	7.42%
		20.00%	277V	10.04%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.994
		0.9	277V	0.926
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	5029±355	5086
		4 step	5029±220	
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		3
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		95
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%		48.04%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<22		21.4
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		0.183
(Goniophotometer - Section 4.2)		Non-Wrost Case		0.378
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		46.9
(Goniophotometer - Section 4.2)		Non-Wrost Case		45.1

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2022/7/27	TOMO-8/48W/5000K	D1
2	Goniophotometer Test	2022/7/27	TOMO-8/48W/5000K	D1
3	THD and PF Test	2022/7/27	TOMO-8/48W/5000K	D1

### Remark(If any)

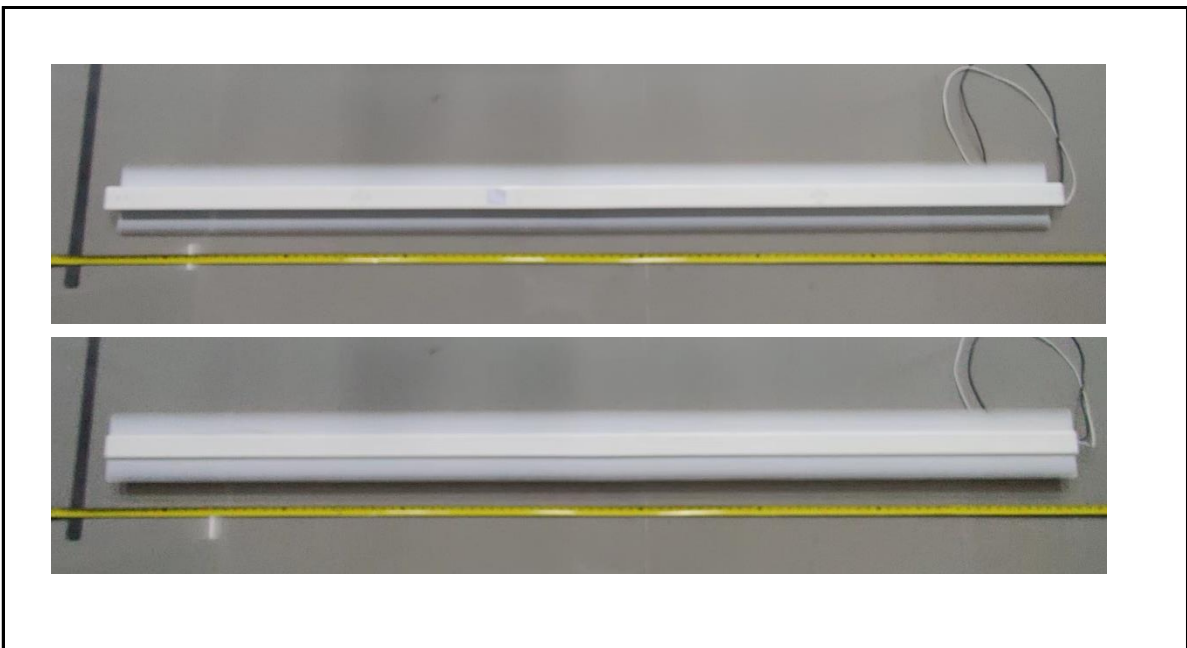
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## 3.0 Production Description

**Luminaire Description:** TOMO-8/48W/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.	TOMO-8/48W/5000K	Sample ID.	D1
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

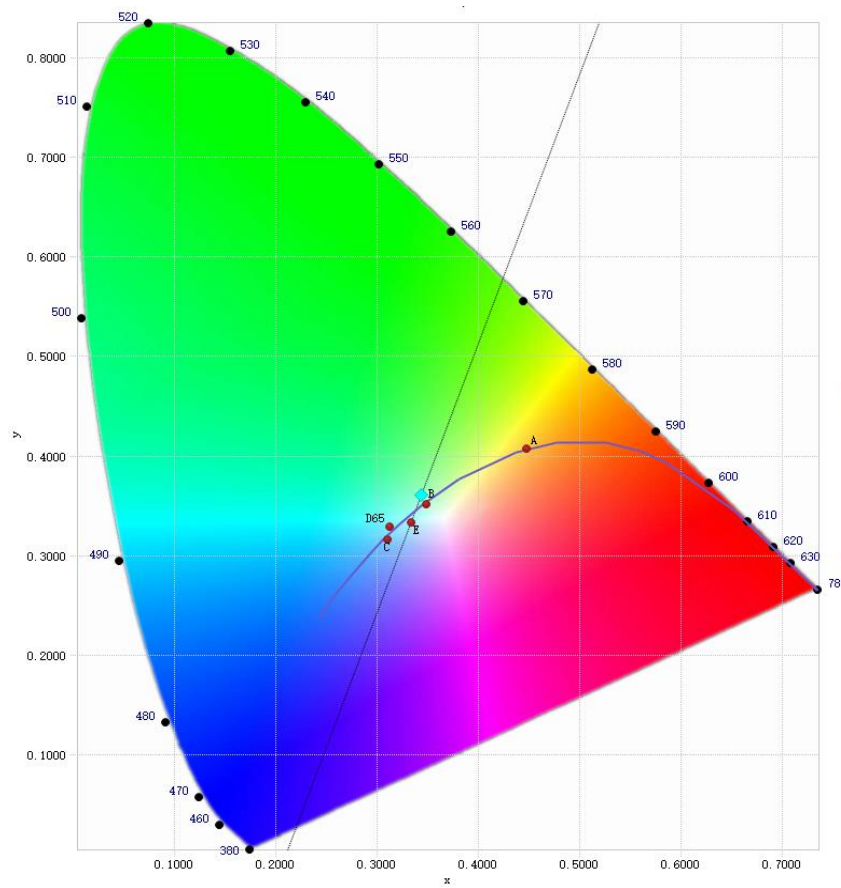
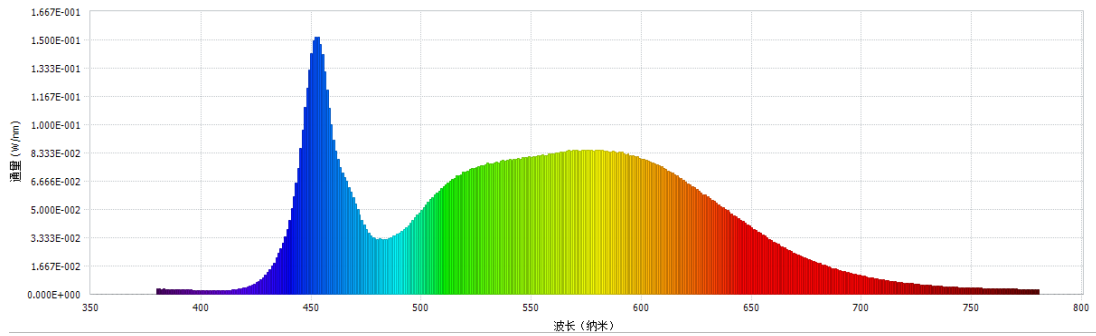
Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
119.99	60	0.378	45.1	0.994
276.98	60	0.183	46.9	0.926

#### Test Result

CCT (K)	CRI	R9	Duv
5086	82	3	0.0052

Rf	Rg	IES Rcs,h1
83	95	-13%

## 4.1 Integrating Sphere Test



## 4.1 Integrating Sphere Test

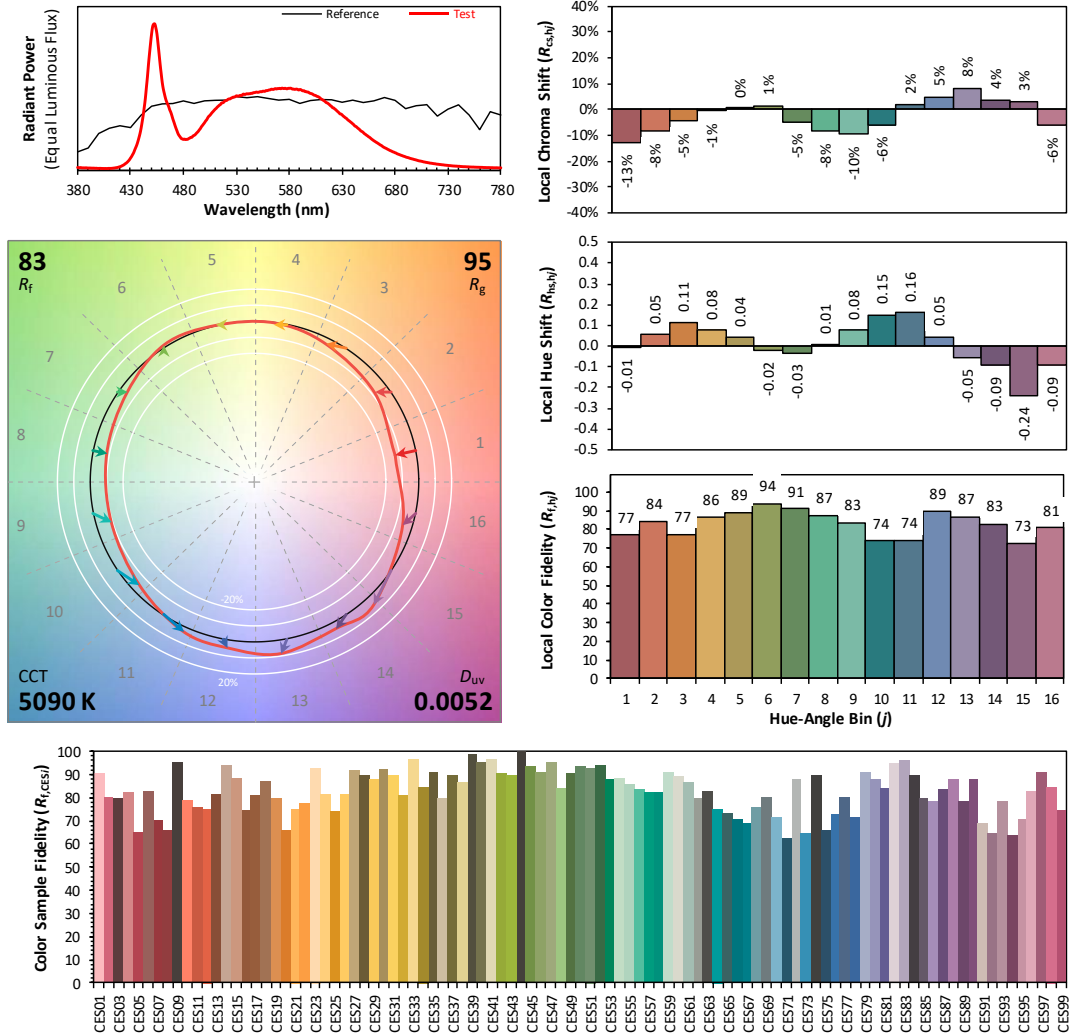
### IES TM-30-18 Color Rendition Report

Source: DLF2207108-4a

Manufacturer: RAB Lighting Inc.

Date: 2022/7/27

Model: TOMO-8/48W/5000K



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

$x$  0.3435  
 $y$  0.3608  
 $u'$  0.2068  
 $v'$  0.4888

CIE 13.3-1995  
 (CRI)

$R_a$  83  
 $R_g$  9

## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

Model No.	TOMO-8/48W/5000K	Sample ID.	D1
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	276.98	60	0.183	46.9	0.926
NON-WROST CASE	119.99	60	0.378	45.1	0.994

#### Test Result

4FT light output in Sphere	3152	Scale Factor	1.92892679
8FT light output in Sphere	6079	4FT Gonio Light output	3223

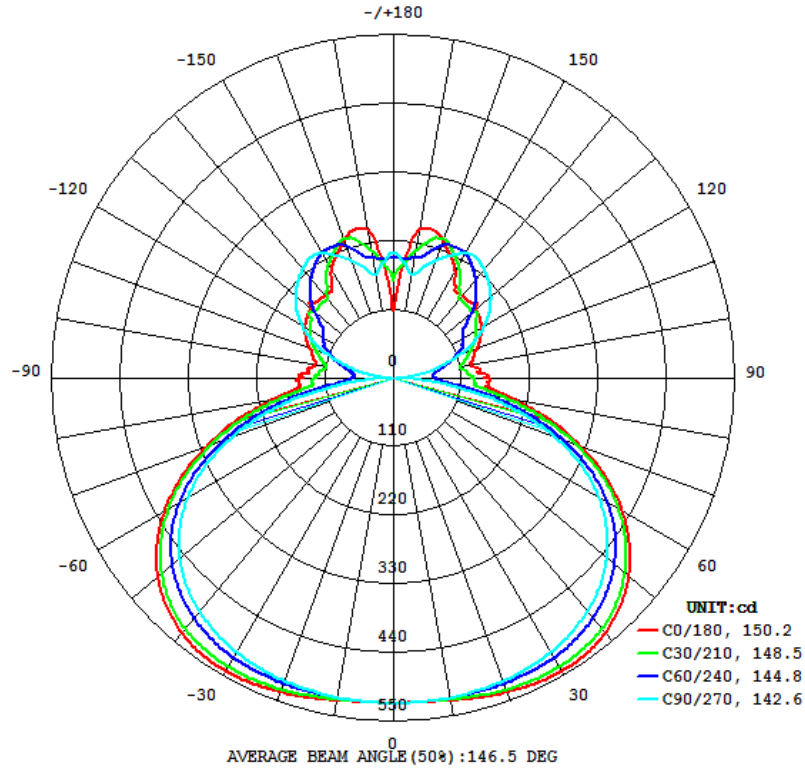
Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
6217	360.0	360.0	150.2	142.6	132.6

Zonal Lumen Requirement ( $0^{\circ}$ - $60^{\circ}$ )	UGR (X=4H, Y=8H, 70/50/20%)	Length(ft)	Lumen/ft
48.04%	21.4	8.00	777

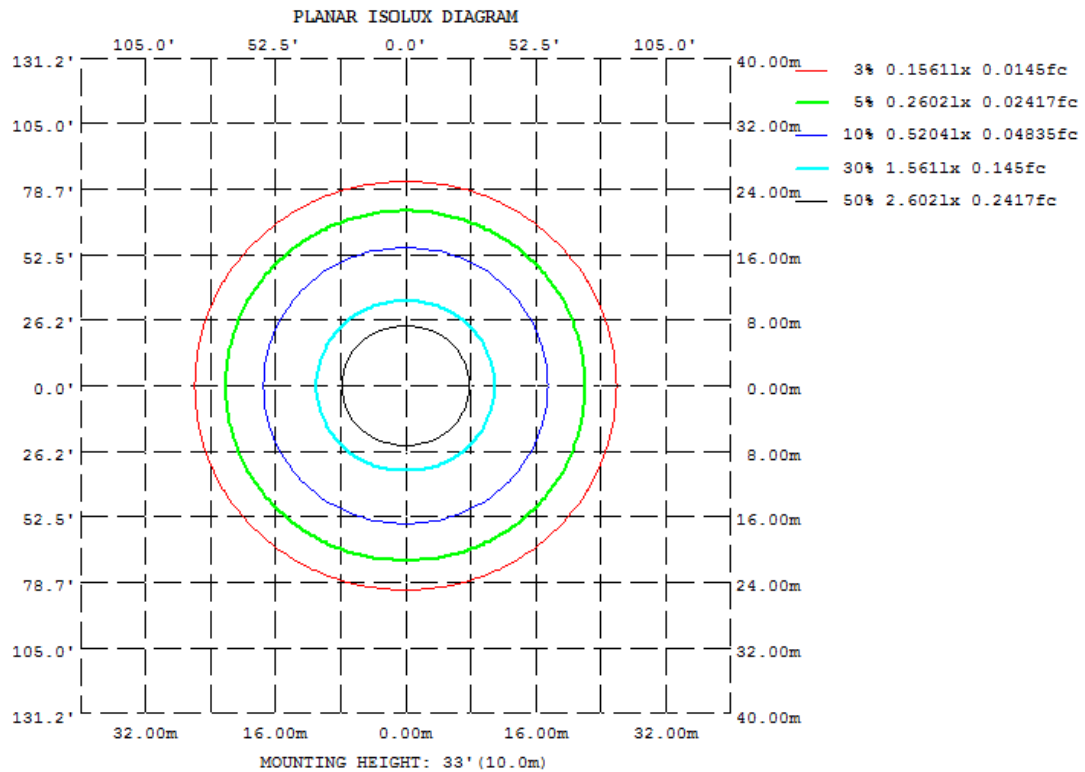


## 4.2 Goniophotometer Test

### Light Distrubtion Curve



### Isolux Plot





## 4.2 Goniophotometer Test

### 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	14.5	15.7	15.2	16.5	17.4	15.1	16.2	15.8	17.0	17.9
	3H	16.8	17.9	17.5	18.7	19.6	17.5	18.6	18.2	19.4	20.3
	4H	17.7	18.7	18.5	19.5	20.5	18.6	19.6	19.3	20.4	21.4
	6H	18.4	19.4	19.2	20.2	21.1	19.5	20.5	20.3	21.3	22.3
	8H	18.6	19.5	19.4	20.4	21.3	20.0	20.9	20.8	21.7	22.7
	12H	18.8	19.6	19.6	20.5	21.5	20.5	21.4	21.3	22.2	23.2
4H	2H	15.4	16.4	16.1	17.2	18.1	15.8	16.8	16.5	17.6	18.6
	3H	17.9	18.7	18.6	19.6	20.5	18.4	19.3	19.2	20.1	21.1
	4H	18.9	19.7	19.7	20.5	21.5	19.7	20.5	20.5	21.3	22.3
	6H	19.7	20.4	20.5	21.3	22.3	20.8	21.5	21.6	22.4	23.4
	8H	20.0	20.7	20.8	21.5	22.5	21.4	22.0	22.2	22.9	23.9
	12H	20.2	20.8	21.0	21.7	22.7	22.0	22.6	22.8	23.4	24.5
8H	4H	19.4	20.1	20.2	20.9	21.9	20.1	20.7	20.9	21.6	22.6
	6H	20.4	21.0	21.3	21.9	22.9	21.4	22.0	22.3	22.9	23.9
	8H	20.8	21.3	21.7	22.2	23.2	22.1	22.6	23.0	23.5	24.5
	12H	21.1	21.5	22.0	22.4	23.5	22.9	23.4	23.8	24.2	25.3
12H	4H	19.5	20.1	20.3	21.0	22.0	20.1	20.7	20.9	21.6	22.6
	6H	20.6	21.1	21.4	22.0	23.0	21.5	22.0	22.4	22.9	24.0
	8H	21.1	21.5	21.9	22.4	23.5	22.3	22.7	23.2	23.6	24.7

Maximum UGR = 25.3

### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	95.93	0 - 10	95.93	1.54%
10-20	286.52	0 - 20	382.45	6.15%
20-30	469.47	0 - 30	851.92	13.70%
30-40	628.99	0 - 40	1480.91	23.82%
40-50	738.74	0 - 50	2219.65	35.70%
50-60	767.02	0 - 60	2986.67	48.04%
60-70	683.25	0 - 70	3669.92	59.03%
70-80	480.28	0 - 80	4150.20	66.75%
80-90	243.60	0 - 90	4393.80	70.67%
90-100	187.69	0 - 100	4581.49	73.69%
100-110	213.34	0 - 110	4794.83	77.12%
110-120	261.78	0 - 120	5056.61	81.33%
120-130	284.02	0 - 130	5340.63	85.90%
130-140	274.31	0 - 140	5614.94	90.31%
140-150	248.03	0 - 150	5862.97	94.30%
150-160	200.09	0 - 160	6063.06	97.52%
160-170	119.08	0 - 170	6182.14	99.43%
170-180	35.28	0 - 180	6217.42	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	112	112	112	112	106	106	106	106	95	95	95	85	85	85	75	75	75	71
1	100	95	90	86	95	90	86	82	80	77	74	71	69	66	63	61	59	55
2	90	81	74	68	85	77	70	65	69	63	59	61	57	53	54	51	48	44
3	82	70	62	55	77	67	59	53	59	53	48	53	48	44	47	43	39	36
4	74	62	53	46	69	58	50	44	52	45	40	46	41	36	41	37	33	30
5	68	55	45	39	63	52	43	37	46	39	34	41	35	31	36	32	28	25
6	62	49	40	33	58	46	38	32	41	34	29	37	31	27	33	28	24	21
7	57	44	35	29	54	41	33	28	37	30	25	33	28	23	30	25	21	19
8	53	40	31	25	50	38	30	24	34	27	22	30	25	20	27	22	19	16
9	49	36	28	22	46	34	27	21	31	24	20	28	22	18	25	20	17	14
10	46	33	25	20	43	31	24	19	28	22	18	26	20	16	23	18	15	13

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

Model No.	TOMO-8/48W/5000K	Sample ID.	D1
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
119.99	60	0.378	45.1	0.994	7.42%
276.98	60	0.183	46.9	0.926	10.04%

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