

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

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DLF2207103

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2022/7/11

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2022/7/15

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		4789
Lumen/ft (Goniophotometer - Section 4.2)	IES LM-79-2008	≥375		1197
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 115	Premium 130	137.6
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		34.8
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	6.56%
		20.00%	277V	11.68%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.996
		0.9	277V	0.970
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	5029±355	5141
		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		2
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		94
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%		48.03%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<22		22.9
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		0.130
(Goniophotometer - Section 4.2)		Non-Wrost Case		0.291
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		34.8
(Goniophotometer - Section 4.2)		Non-Wrost Case		34.7

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2022/7/11	TOMO-4/36W/5000K	H1
2	Goniophotometer Test	2022/7/11	TOMO-4/36W/5000K	H1
3	THD and PF Test	2022/7/11	TOMO-4/36W/5000K	H1

Remark(If any)

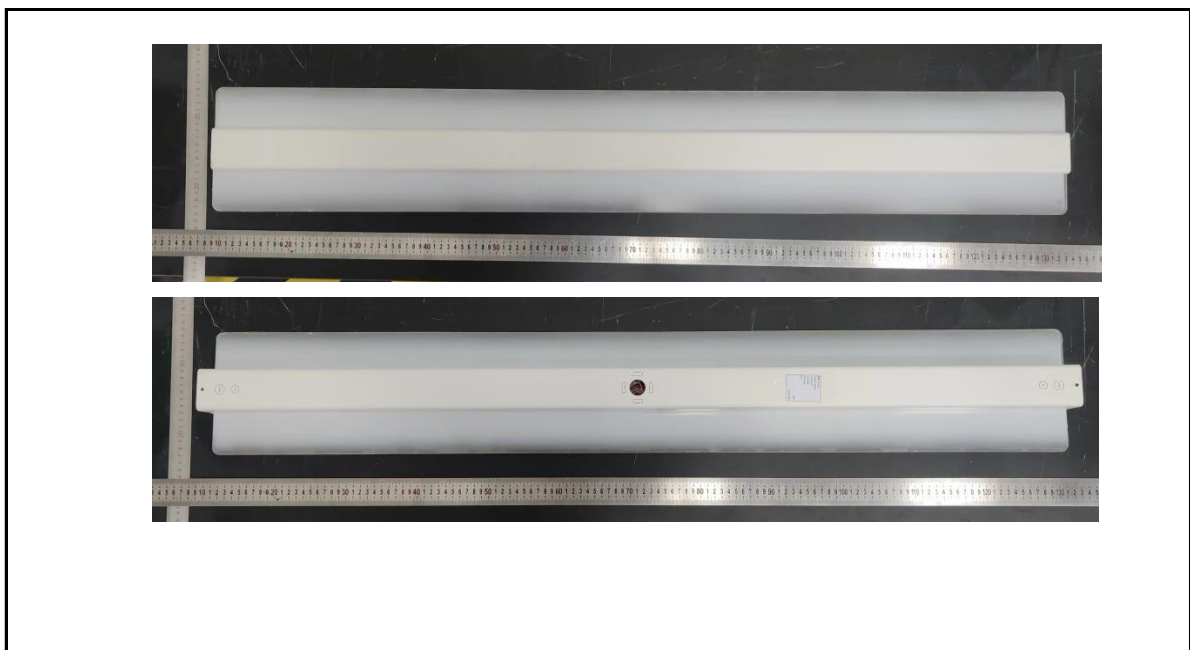
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3.0 Production Description

Luminaire Description: TOMO-4/36W/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-4/36W/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

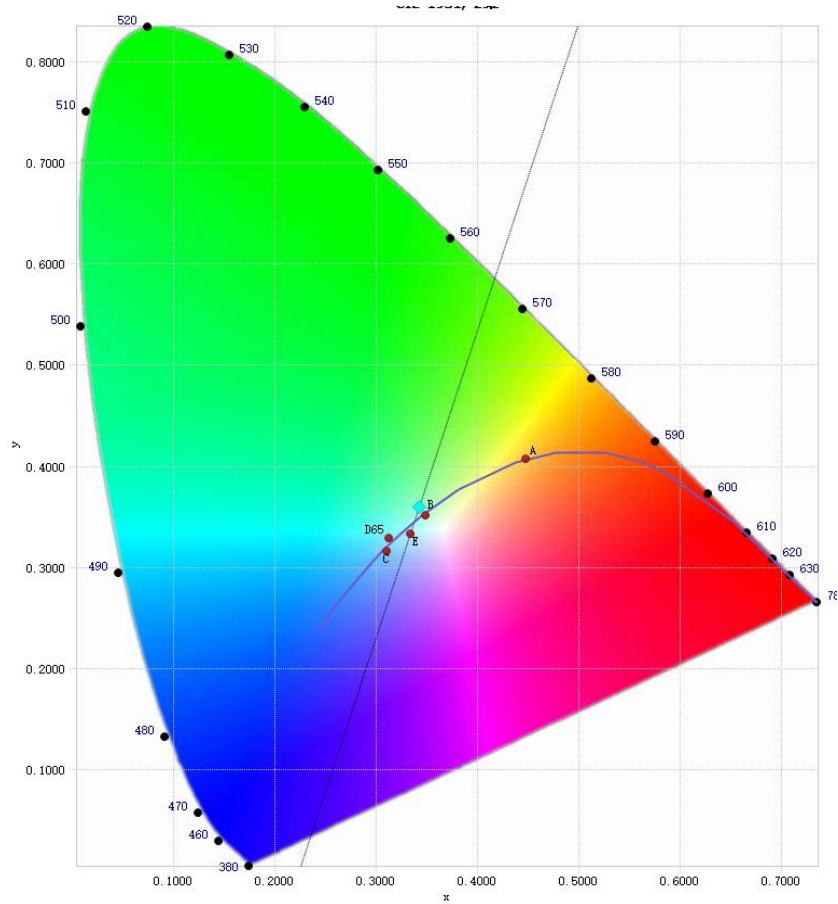
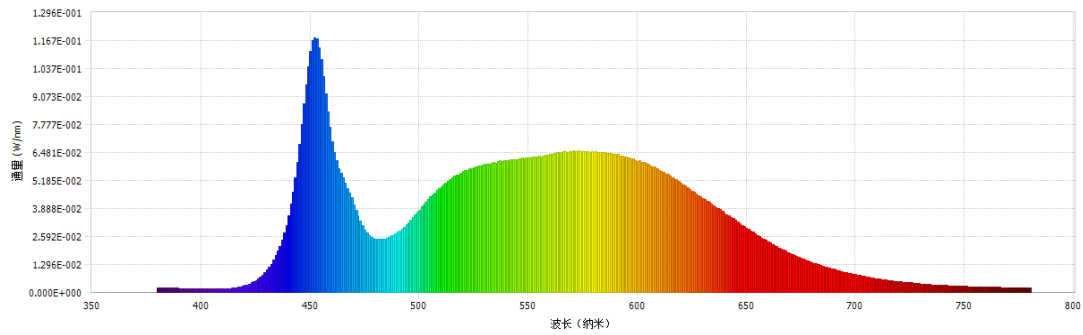
Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.07	60	0.288	34.4	0.996
276.98	60	0.128	34.5	0.970

Test Result

CCT (K)	CRI	R9	Duv
5141	82	2	0.0052

Rf	Rg	IES Rcs,h1
83	94	-13%

4.1 Integrating Sphere Test



4.1 Integrating Sphere Test

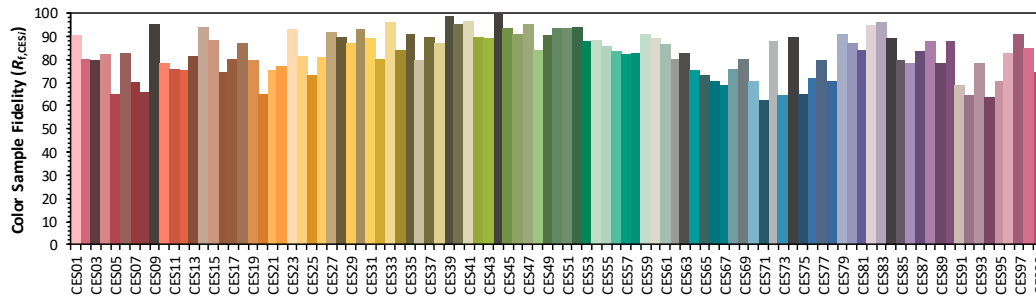
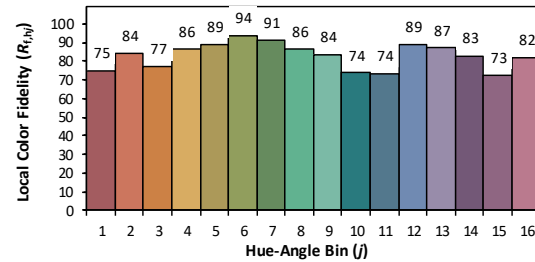
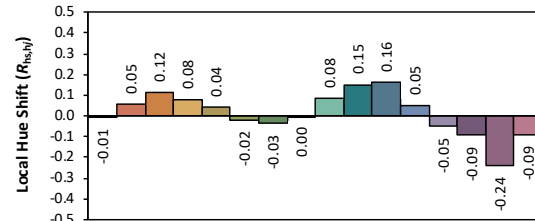
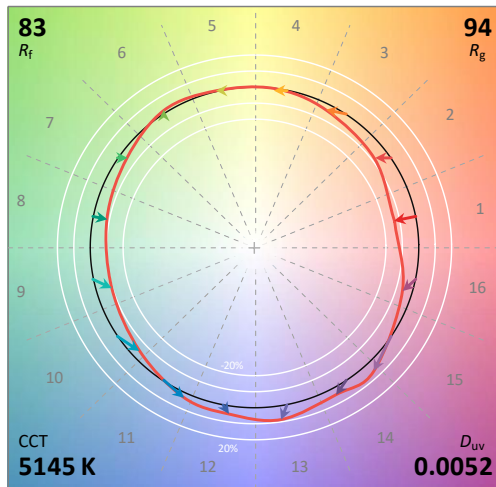
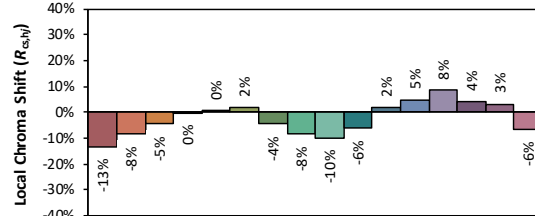
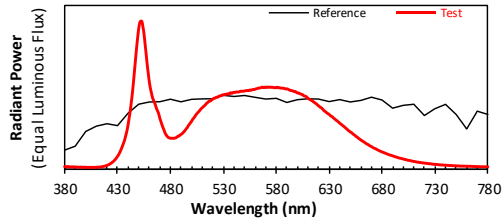
IES TM-30-18 Color Rendition Report

Source: DLF2207103-8a

Manufacturer: RAB Lighting Inc.

Date: 2022/7/11

Model: TOMO-4/36W/5000K



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

x 0.3419
 y 0.3594
 u' 0.2063
 v' 0.4880

CIE 13.3-1995
(CRI)

R_a 82
 R_g 9

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	TOMO-4/36W/5000K	Sample ID.	H1
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	277.05	60	0.130	34.8	0.969
NON-WROST CASE	120.01	60	0.291	34.7	0.995

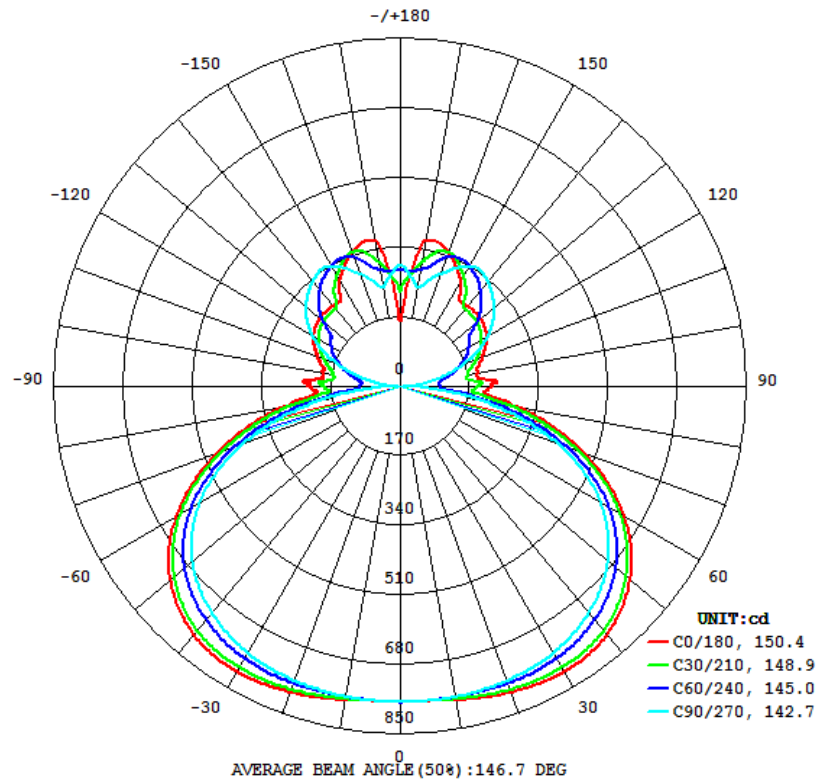
Test Result

Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
4789	360.0	360.0	150.4	142.7	137.6

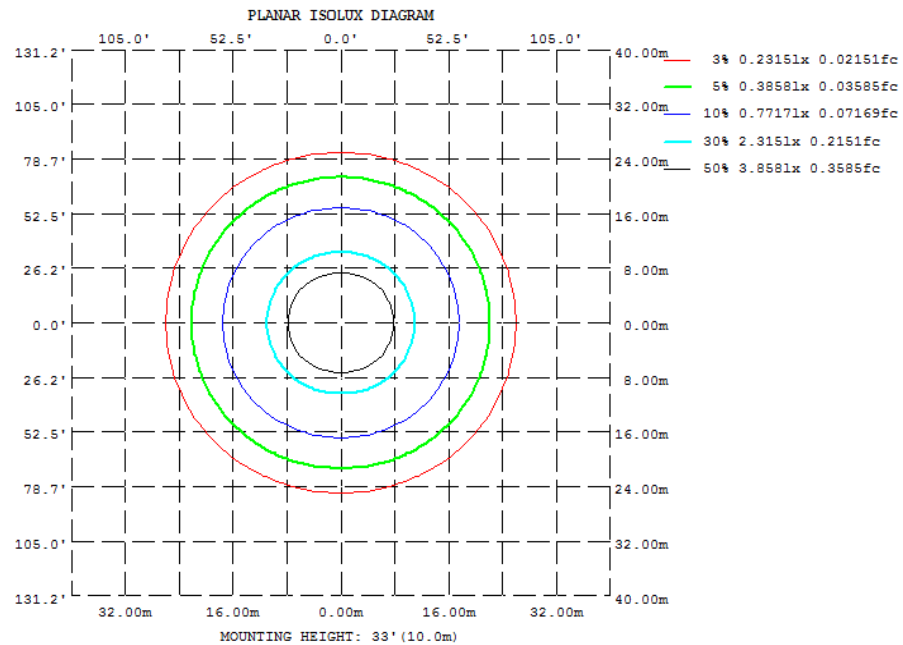
Zonal Lumen Requirement (0° - 60°)	UGR (X=4H, Y=8H, 70/50/20%)	Length(ft)	Lumen/ft
48.03%	22.9	4.00	1197

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	777.7	772.3	770.3	772.3	777.7	772.3	770.3	772.3
20	795.4	780.7	765.2	780.7	795.4	780.7	765.2	780.7
30	805.0	780.3	751.2	780.3	805.0	780.3	751.2	780.3
40	790.8	762.0	721.4	762.0	790.8	762.0	721.4	762.0
50	737.7	709.9	666.0	709.9	737.7	709.9	666.0	709.9
60	635.1	609.6	568.6	609.6	635.1	609.6	568.6	609.6
70	480.8	453.5	411.9	453.5	480.8	453.5	411.9	453.5
80	292.0	254.4	199.5	254.4	292.0	254.4	199.5	254.4
90	228.5	156.6	8.158	156.6	228.5	156.6	8.158	156.6
100	193.8	141.6	68.13	141.6	193.8	141.6	68.13	141.6
110	215.9	181.8	168.8	181.8	215.9	181.8	168.8	181.8
120	246.7	217.7	250.2	217.7	246.7	217.7	250.2	217.7
130	259.5	234.4	303.2	234.4	259.5	234.4	303.2	234.4
140	258.8	277.7	336.4	277.7	258.8	277.7	336.4	277.7
150	299.9	329.4	338.8	329.4	299.9	329.4	338.8	329.4
160	350.1	341.3	293.4	341.3	350.1	341.3	293.4	341.3
170	363.2	300.5	247.9	300.5	363.2	300.5	247.9	300.5
180	162.4	266.4	296.8	266.4	162.4	266.4	296.8	266.4
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	17.2	16.8	18.0	18.9	16.6	17.8	17.3	18.5	19.5
	3H	18.3	19.4	19.1	20.2	21.1	19.0	20.1	19.8	20.9	21.9
	4H	19.2	20.2	20.0	21.0	22.0	20.1	21.1	20.9	21.9	22.9
	6H	19.9	20.9	20.7	21.7	22.7	21.1	22.0	21.9	22.8	23.8
	8H	20.1	21.1	20.9	21.9	22.9	21.5	22.4	22.3	23.3	24.3
	12H	20.3	21.2	21.1	22.0	23.0	22.0	22.9	22.8	23.7	24.7
4H	2H	16.9	17.9	17.6	18.7	19.7	17.3	18.3	18.1	19.1	20.1
	3H	19.4	20.2	20.2	21.1	22.1	20.0	20.9	20.8	21.7	22.7
	4H	20.4	21.2	21.2	22.0	23.1	21.2	22.0	22.0	22.8	23.8
	6H	21.2	22.0	22.1	22.8	23.8	22.4	23.1	23.2	23.9	24.9
	8H	21.5	22.2	22.3	23.0	24.1	22.9	23.6	23.7	24.4	25.4
	12H	21.7	22.3	22.6	23.2	24.2	23.5	24.1	24.3	24.9	26.0
8H	4H	20.9	21.6	21.7	22.4	23.5	21.6	22.3	22.4	23.1	24.1
	6H	21.9	22.5	22.8	23.4	24.4	23.0	23.5	23.8	24.4	25.4
	8H	22.3	22.8	23.2	23.7	24.8	23.6	24.1	24.5	25.0	26.1
	12H	22.6	23.1	23.5	23.9	25.0	24.4	24.8	25.2	25.7	26.8
12H	4H	21.0	21.6	21.9	22.5	23.5	21.6	22.2	22.5	23.1	24.1
	6H	22.1	22.6	23.0	23.5	24.6	23.1	23.6	23.9	24.4	25.5
	8H	22.6	23.0	23.5	23.9	25.0	23.8	24.2	24.7	25.1	26.2

Maximum UGR = 26.8

4.2 Goniophotometer Test

ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	73.70	0 - 10	73.70	1.54%
10-20	220.33	0 - 20	294.03	6.14%
20-30	361.22	0 - 30	655.25	13.68%
30-40	484.28	0 - 40	1139.53	23.80%
40-50	569.07	0 - 50	1708.60	35.68%
50-60	591.51	0 - 60	2300.11	48.03%
60-70	527.49	0 - 70	2827.60	59.05%
70-80	371.58	0 - 80	3199.18	66.81%
80-90	183.25	0 - 90	3382.43	70.63%
90-100	146.13	0 - 100	3528.56	73.69%
100-110	165.58	0 - 110	3694.14	77.14%
110-120	202.36	0 - 120	3896.50	81.37%
120-130	218.45	0 - 130	4114.95	85.93%
130-140	210.83	0 - 140	4325.78	90.33%
140-150	190.80	0 - 150	4516.58	94.32%
150-160	153.70	0 - 160	4670.28	97.53%
160-170	91.41	0 - 170	4761.69	99.44%
170-180	27.00	0 - 180	4788.69	100.00%

4.2 Goniophotometer Test

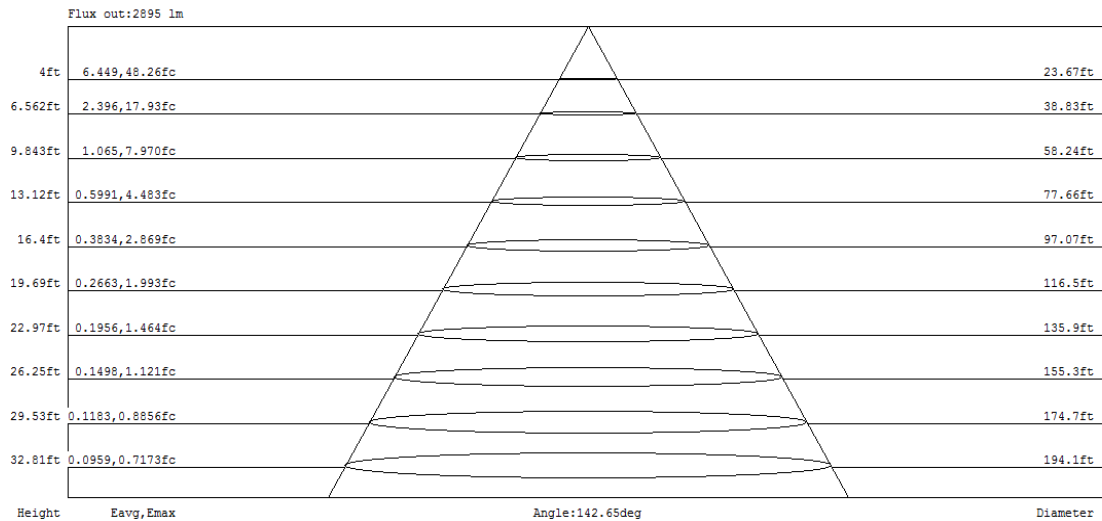
COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

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	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	27	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

CONE OF LIGHT DIAGRAM



4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	TOMO-4/36W/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
120.07	60	0.288	34.4	0.996	6.56%
276.98	60	0.128	34.5	0.970	11.68%

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*****