

Photometric Test Report

Relevant Standards

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

Prepared For

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DLF2211104

Report Number

DLF2211104-6a

Test Date

2022/11/23

Issue Date


2022/11/29

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	-		282
Lumen/ft (Goniophotometer - Section 4.2)	IES LM-79-2008	≥ 375		440
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	-		64.0
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		4.4
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%		3.73%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9		0.994
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	2725 \pm 145	2693
		4 step	2725 \pm 83	
Minimum CRI (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥ 80		93
Minimum R9 (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥ 0		65
Minimum Rf (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥ 70		93
Minimum Rg (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥ 89		98
Minimum IES Rcs,h1 (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	-12% \leq IES Rcs,h1 \leq +23%		-4%
Zonal Lumen Requirement (0°-60°) (Goniophotometer - Section 4.2)	IES LM-79-2008	$\geq 40\%$		79.37%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<22		25.2

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2022/11/23	KNOOKFA8 / 4W / 2700K	G1
2	Goniophotometer Test	2022/11/23	KNOOKFA8 / 4W / 2700K	G1
3	THD and PF Test	2022/11/23	KNOOKFA8 / 4W / 2700K	G1

Remark(If any)

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3.0 Production Description

Luminaire Description: KNOOKFA8 / 4W / 2700K

Electrical Specification: 120V,50/60HZ

Photos of Luminaire Characteristics



4.0 LM-79 Measurement and Test Results

4.1 Integrating Sphere Test

Model No.	KNOOKFA8 / 4W / 2700K	Sample ID.	G1
Operate time (Min.)	90	Stabilization time (Min.)	45
Temperature (°C)	25.3	Humidity (%RH)	55.4

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
119.95	60	0.037	4.4	0.994

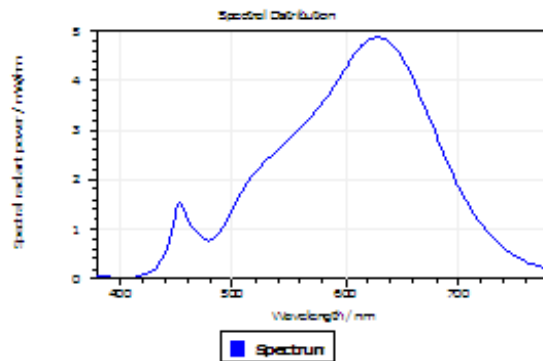
Test Result

CCT (K)	CRI	R9	Duv
2693	93	65	0.0029

Rf	Rg	IES Rcs,h1
93	98	-4%

4.1 Integrating Sphere Test

Results



Spectral values

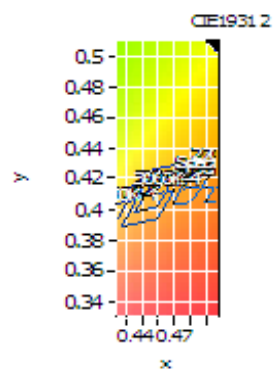
DominantWavelength 583.34 nm
Purity 0.658
PeakWavelength 628.20 nm
Radiant Power 0.8064 W
Width50%:

Color Coordinates

Correlated Color Temperat 2693 K
x: 0.4656 u: 0.2620 u': 0.2620
y: 0.4200 v: 0.3545 v': 0.5317

CRI01	93.2	CRI09	65.1
CRI02	95.1	CRI10	87.6
CRI03	95.9	CRI11	95.4
CRI04	94.5	CRI12	79.3
CRI05	92.4	CRI13	93.5
CRI06	94.4	CRI14	96.7
CRI07	95.0	CRI15	89.4
CRI08	85.3	CRI16	89.0

ResultsCRI 93.2



PlanckDistance 2.9E-003

4.1 Integrating Sphere Test

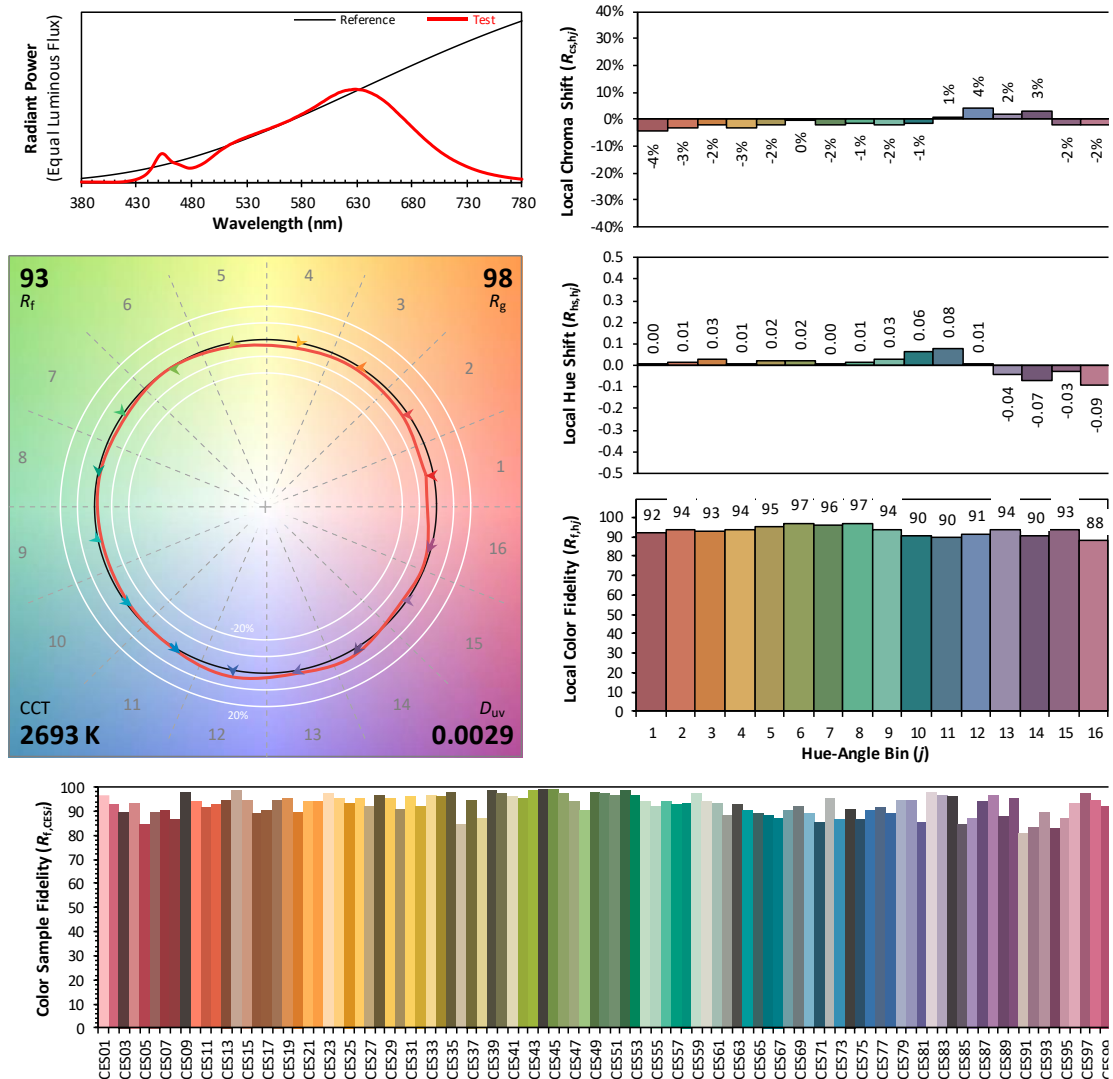
IES TM-30-18 Color Rendition Report

Source: DLF2211104-6a

Manufacturer: RAB Lighting Inc.

Date: 2022/11/23

Model: KNOOKFA8 / 4W / 2700K



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

x 0.4656
 y 0.4200
 u' 0.2620
 v' 0.5317

CIE 13.3-1995
(CRI)

R_a 93
 R_g 66

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	KNOOKFA8 / 4W / 2700K	Sample ID.	G1
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
WORST CASE	120.05	60	0.037	4.4	0.993

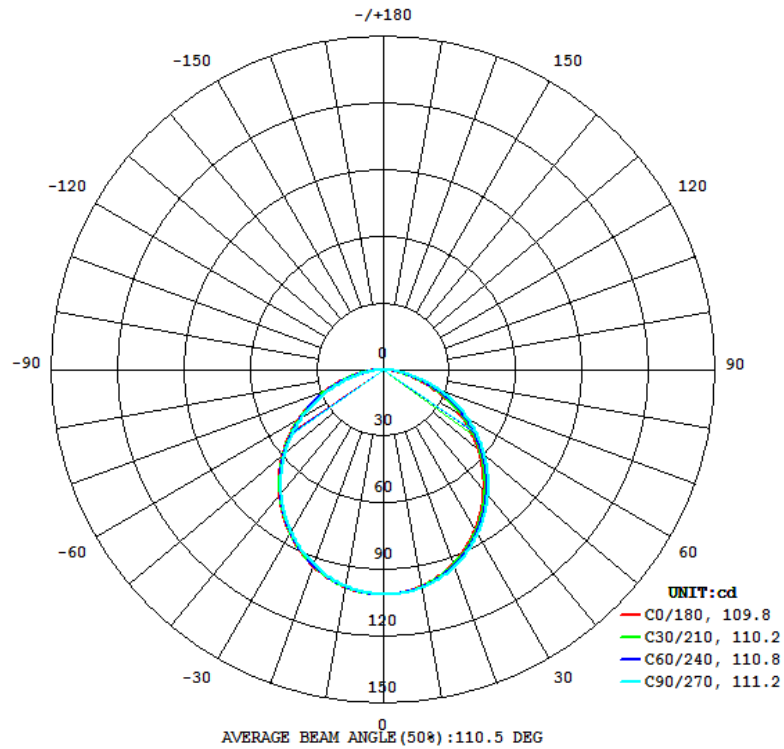
Test Result

Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
282	159.2	160.1	109.8	111.2	64.0

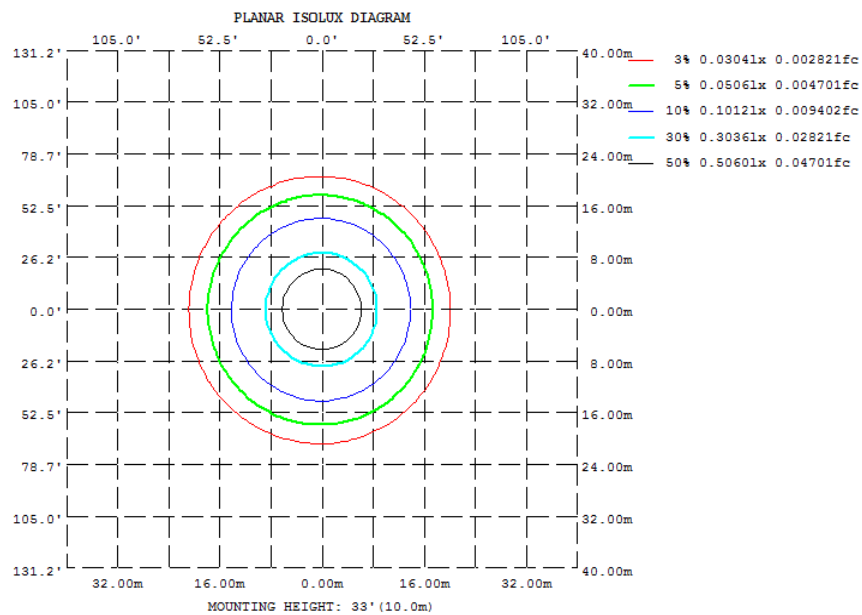
Zonal Lumen Requirement (0° - 60°)	UGR (X=4H, Y=8H, 70/50/20%)	Length(ft)	Lumen/ft
79.37%	25.2	0.64	440

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	98.84	99.17	99.54	99.58	99.45	99.19	98.97	98.80
20	92.68	93.41	94.12	94.19	93.85	93.43	93.03	92.65
30	83.19	84.30	85.36	85.41	84.88	84.42	83.86	83.26
40	70.97	72.39	73.81	73.90	73.28	72.72	72.08	71.17
50	56.51	58.25	60.09	60.31	59.66	59.03	58.22	56.93
60	40.31	42.27	44.48	45.08	44.51	43.75	42.63	40.93
70	23.03	25.04	27.57	28.64	28.30	27.42	25.79	23.81
80	6.879	8.611	10.90	12.05	12.23	11.35	9.522	7.701
90	0.0434	0.2387	0.3740	0.7095	0.5827	0.3578	0.1889	0.2339
100	0.0330	0.1058	0.2030	0.1322	0.0329	0.1200	0.1871	0.1213
110	0.0403	0.0426	0.0872	0.0426	0.0424	0.0614	0.1050	0.0517
120	0.0526	0.0517	0.0468	0.0515	0.0513	0.0495	0.0580	0.0471
130	0.0632	0.0603	0.0588	0.0627	0.0691	0.0693	0.0677	0.0690
140	0.0720	0.0703	0.0707	0.0730	0.0938	0.0923	0.0923	0.0934
150	0.0781	0.0781	0.0779	0.0778	0.1002	0.0998	0.0996	0.0992
160	0.0843	0.0847	0.0843	0.0847	0.1005	0.1001	0.0994	0.0991
170	0.0894	0.0896	0.0889	0.0880	0.0998	0.1001	0.0992	0.0998
180	0.0989	0.0983	0.0983	0.0985	0.0991	0.0990	0.0985	0.0985
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	20.8	22.4	21.2	22.7	23.1	20.8	22.4	21.2	22.8	23.1	
4H	22.6	24.1	23.0	24.4	24.8	22.7	24.2	23.1	24.5	24.8	
6H	23.3	24.7	23.7	25.0	25.4	23.4	24.8	23.8	25.1	25.5	
8H	23.7	25.0	24.1	25.4	25.8	23.9	25.2	24.3	25.6	26.0	
12H	23.9	25.1	24.3	25.5	25.9	24.1	25.3	24.5	25.7	26.1	
	23.9	25.1	24.3	25.5	25.9	24.2	25.4	24.6	25.8	26.2	
4H 2H	21.4	22.8	21.8	23.2	23.5	21.5	22.9	21.9	23.2	23.6	
3H	23.4	24.6	23.9	25.0	25.4	23.5	24.7	24.0	25.1	25.5	
4H	24.2	25.3	24.7	25.7	26.1	24.4	25.4	24.8	25.8	26.3	
6H	24.8	25.7	25.2	26.2	26.6	25.0	26.0	25.5	26.4	26.9	
8H	25.0	25.8	25.4	26.3	26.7	25.2	26.1	25.7	26.6	27.0	
12H	25.1	25.9	25.6	26.3	26.8	25.4	26.2	25.9	26.7	27.1	
8H 4H	24.5	25.4	24.9	25.8	26.3	24.7	25.6	25.1	26.0	26.5	
6H	25.2	25.9	25.7	26.4	26.9	25.5	26.2	26.0	26.7	27.1	
8H	25.4	26.1	25.9	26.6	27.1	25.8	26.4	26.3	26.9	27.4	
12H	25.6	26.2	26.1	26.6	27.2	26.0	26.6	26.5	27.1	27.6	
12H 4H	24.5	25.3	25.0	25.8	26.2	24.7	25.5	25.2	26.0	26.4	
6H	25.2	25.9	25.8	26.3	26.9	25.5	26.2	26.1	26.6	27.2	
8H	25.5	26.1	26.0	26.6	27.1	25.9	26.4	26.4	26.9	27.5	

Maximum UGR = 27.6

4.2 Goniophotometer Test

ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	9.56	0 - 10	9.56	3.39%
10-20	27.30	0 - 20	36.86	13.09%
20-30	41.13	0 - 30	77.99	27.69%
30-40	49.25	0 - 40	127.24	45.17%
40-50	50.76	0 - 50	178.00	63.19%
50-60	45.55	0 - 60	223.55	79.37%
60-70	34.29	0 - 70	257.84	91.54%
70-80	18.83	0 - 80	276.67	98.22%
80-90	4.46	0 - 90	281.13	99.81%
90-100	0.17	0 - 100	281.30	99.87%
100-110	0.08	0 - 110	281.38	99.90%
110-120	0.05	0 - 120	281.43	99.91%
120-130	0.05	0 - 130	281.48	99.93%
130-140	0.06	0 - 140	281.54	99.95%
140-150	0.05	0 - 150	281.59	99.97%
150-160	0.04	0 - 160	281.63	99.99%
160-170	0.03	0 - 170	281.66	100.00%
170-180	0.01	0 - 180	281.67	100.00%

4.2 Goniophotometer Test

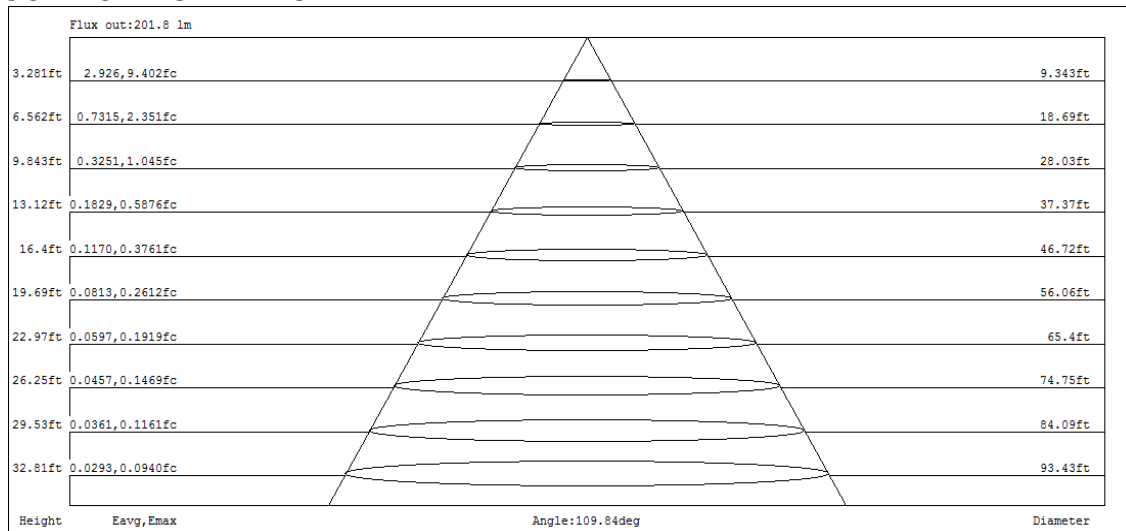
COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

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	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	109	104	100	96	106	102	98	94	97	94	91	93	91	89	90	88	86	84
2	99	91	84	78	96	89	83	77	85	80	75	82	77	74	79	75	72	70
3	90	80	71	65	88	78	70	64	75	69	63	72	67	62	70	65	61	59
4	83	71	62	55	80	69	61	55	67	60	54	64	58	53	62	57	52	50
5	76	63	54	47	74	62	53	47	60	52	47	58	51	46	56	50	46	43
6	70	57	48	41	68	56	47	41	54	46	41	52	46	40	51	45	40	38
7	65	51	43	37	63	51	42	36	49	42	36	48	41	36	46	40	36	34
8	60	47	38	33	59	46	38	32	45	38	32	44	37	32	42	36	32	30
9	56	43	35	29	55	42	35	29	41	34	29	40	34	29	39	33	29	27
10	53	40	32	27	52	39	32	27	38	31	26	37	31	26	36	30	26	24

CONE OF LIGHT DIAGRAM



4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	KNOOKFA8 / 4W / 2700K	Sample ID.	G1
Temperature (°C)	25.3	Humidity (%RH)	55.4

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
119.95	60	0.037	4.4	0.994	3.73%

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*****