

Photometric Test Report

Relevant Standards

- ☒ IES LM-79-2008
- ☒ ANSI C82.77:2014

Prepared For

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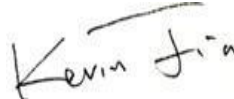
2018/11/23

Prepared By



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1.0 Test Summary

DLC Technical Requirements v4.4

Outdoor - Low output Outdoor Pole/Arm-Mounted Area and Roadway Luminaires			
Requirement Category	Test Method	Requirements	Test value
Lamp Output (lm)	IES LM-79-2008	1000	4687
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	90	110.6
Zonal Lumen Requirement (0°-90°)	IES LM-79-2008	≥99%	100.00%
Zonal Lumen Requirement (80°-90°)	IES LM-79-2008	≤10%	3.56%
Allowable CCTs* (K)	IES LM-79-2008	≤5700	3013
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	≥65	80.5
Power Factor	ANSI C82.77:2014	0.873	0.973
Total Harmonic Distortion (A%)	ANSI C82.77:2014	25.00%	11.28%

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2018/11/22	IVAT2-45L730/H	A1
2	Goniophotometer Test	2018/11/22	IVAT2-45L730[H, 4]	A1
3	THD and PF Test	2018/11/22	IVAT2-45L730[H, 4]	A1

Remark(If any)

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3.0 Production Description

Luminaire Description: IVAT2-45L730[H, 4]

Electrical Specification: 480V,50/60HZ, 45W

Photos of Luminaire Characteristics



4.0 LM-79 Measurement and Test Results

4.1 Integrating Sphere Test

Model No.	IVAT2-45L730[H, 4]	Sample ID.	A1
Operate time (Min.)	90	Stabilization time (Min.)	45

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 Conditions

Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
25.3	479.92	60	0.091	42.4	0.973

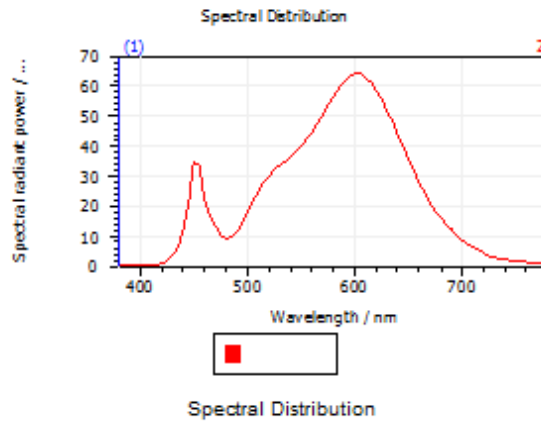
Test Result

CCT (K)	CRI (Ra)	Duv
3013	80.5	1.9E-03

4.1 Integrating Sphere Test

Spectroradiometric Parameters

Results

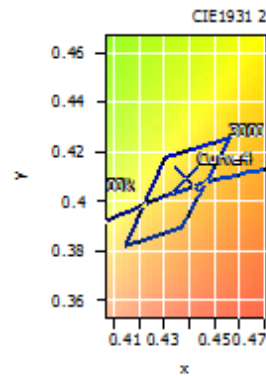


Spectral values

DominantWavelength	582.11 nm
Purity	0.547
PeakWavelength	601.53 nm
Width50%:	130.68 nm

Color Coordinates

Correlated Color Temperatu		3013 K
x: 0.4388	u: 0.2494	u': 0.2494
y: 0.4096	v: 0.3492	v': 0.5238
CRI01	78.2	CRI09
CRI02	88.4	CRI10
CRI03	96.7	CRI11
CRI04	78.7	CRI12
CRI05	78.1	CRI13
CRI06	85.6	CRI14
CRI07	82.5	CRI15
CRI08	56.0	CRI16
ResultsCRI	80.5	



PlanckDistance 1.9E-003

4.0 LM-79 Measurement and Test Results

4.3 Goniophotometer Test

Model No.	IVAT2-45L730[H, 4]	Sample ID.	A1
Operate time (Min.)	90	Stabilization time (Min.)	45

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

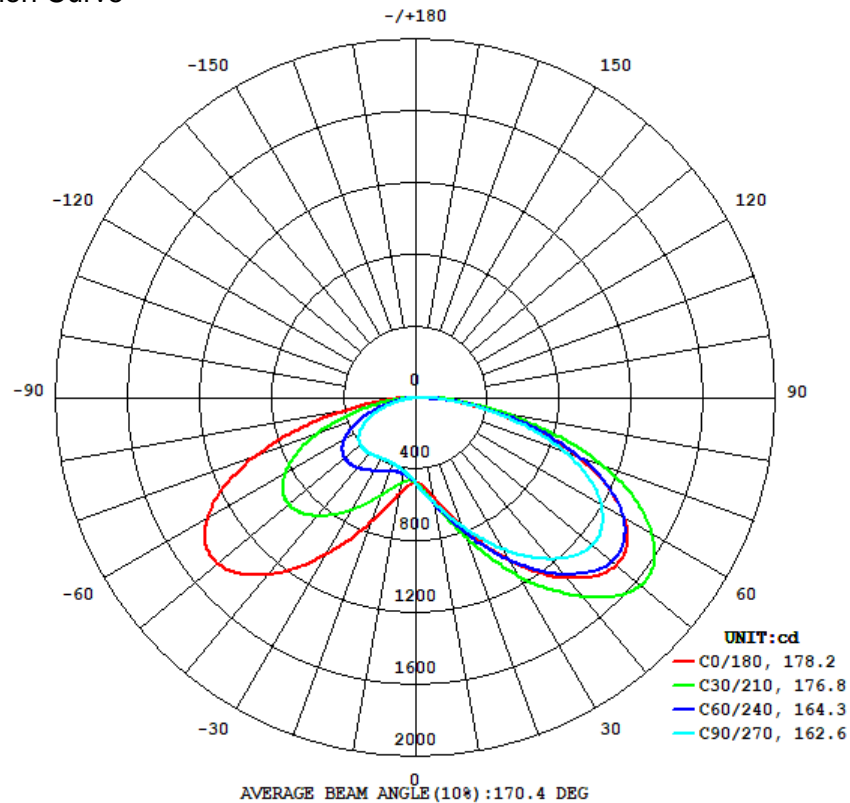
Temperature ($^{\circ}\text{C}$)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
25.1	480.09	60	0.091	42.4	0.971	Light Down

Test Result

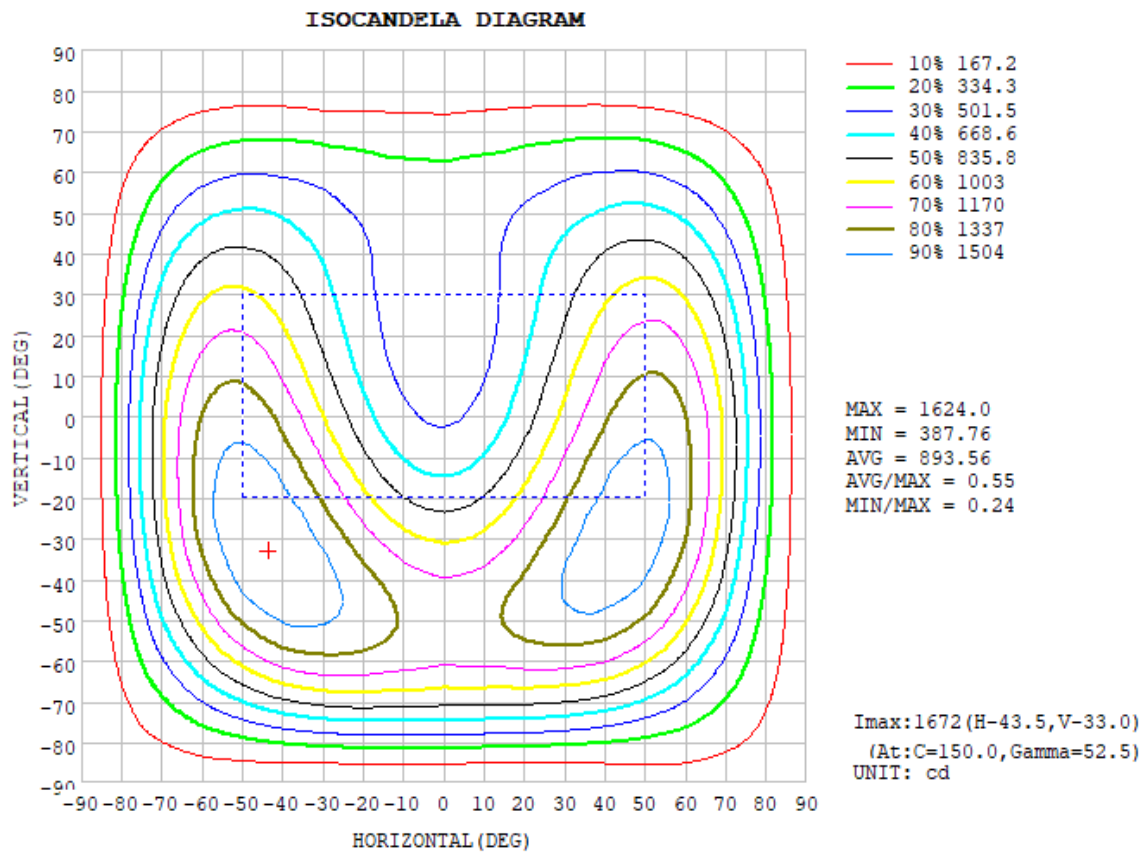
Flux (lm)	Zonal Lumen Requirement (0° - 90°)	Zonal Lumen Requirement (80° - 90°)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
			Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	
4687	100.00%	3.56%	178.4	162.7	167.6	61.4	110.6

4.3 Goniophotometer Test

Light Distrubtion Curve



Isolux Plot



4.3 Goniophotometer Test

Zonal Lumen Summary

DEG	LUMINOUS INTENSITY:cd									
γ	C0	C45	C90	C135	C180	C225	C270	C315		
10	558.5	598.0	592.2	583.0	543.2	455.2	415.3	472.0		
20	765.5	820.4	763.3	803.9	734.1	500.6	390.5	536.2		
30	1045	1108	975.0	1112	1009	580.6	392.1	633.9		
40	1312	1386	1175	1414	1289	659.7	407.6	718.9		
50	1454	1554	1280	1602	1439	687.6	406.2	740.9		
60	1342	1459	1195	1520	1337	613.9	354.4	652.4		
70	959.1	1065	880.8	1109	950.8	425.3	239.3	442.6		
80	420.5	484.2	409.7	503.1	395.9	167.5	73.68	168.5		
90	0	0	0	0	0	0	0	0		
100	0	0	0	0	0	0	0	0		
110	0	0	0	0	0	0	0	0		
120	0	0	0	0	0	0	0	0		
130	0	0	0	0	0	0	0	0		
140	0	0	0	0	0	0	0	0		
150	0	0	0	0	0	0	0	0		
160	0	0	0	0	0	0	0	0		
170	0	0	0	0	0	0	0	0		
180	0	0	0	0	0	0	0	0		

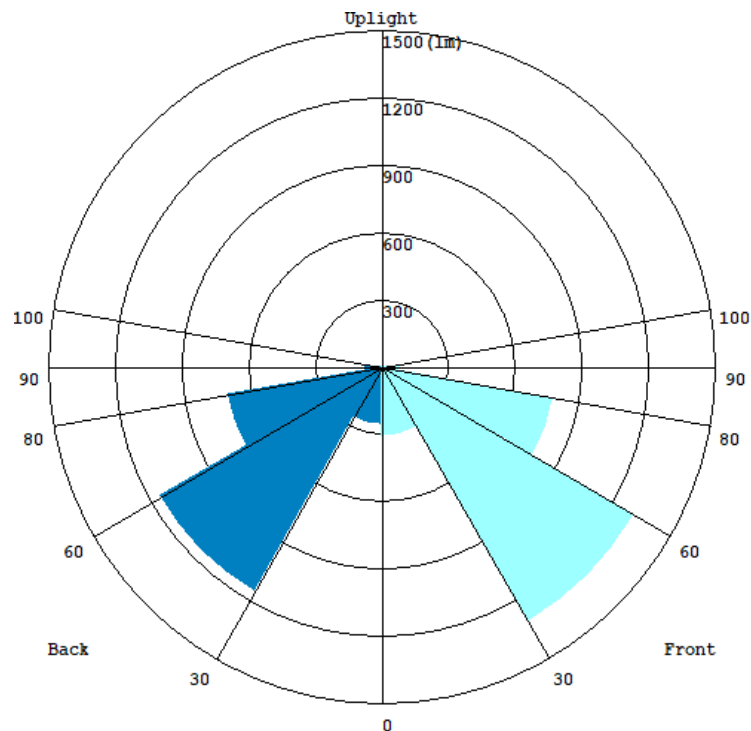
4.3 Goniophotometer Test

ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	47.96	0 - 10	47.96	1.02%
10-20	169.15	0 - 20	217.11	4.63%
20-30	353.56	0 - 30	570.67	12.18%
30-40	601.52	0 - 40	1172.19	25.01%
40-50	856.72	0 - 50	2028.91	43.29%
50-60	1001.34	0 - 60	3030.25	64.66%
60-70	913.30	0 - 70	3943.55	84.14%
70-80	576.15	0 - 80	4519.70	96.44%
80-90	166.93	0 - 90	4686.63	100.00%
90-100	0.00	0 - 100	4686.63	100.00%
100-110	0.00	0 - 110	4686.63	100.00%
110-120	0.00	0 - 120	4686.63	100.00%
120-130	0.00	0 - 130	4686.63	100.00%
130-140	0.00	0 - 140	4686.63	100.00%
140-150	0.00	0 - 150	4686.63	100.00%
150-160	0.00	0 - 160	4686.63	100.00%
160-170	0.00	0 - 170	4686.63	100.00%
170-180	0.00	0 - 180	4686.63	100.00%

3.2 Goniophotometer Test

LCS Graph



BUG-Rating

IESNA Luminaire Flux Distribution Table:

Zone	Lumens	Luminaire %
FL - Front-Low(0-30)	310.5	6.6
FM - Front-Medium(30-60)	1315.3	28.0
FH - Front-High(60-80)	787.83	16.8
FVH - Front-Very High(80-90)	89.331	1.9
Total Forward Light	2502.9	53.3

BL - Back-Low(0-30)	260.74	5.5
BM - Back-Medium(30-60)	1152.4	24.5
BH - Back-High(60-80)	705.56	15.0
BVH - Back-Very High(80-90)	78.487	1.7
Total Back Light	2197.2	46.7

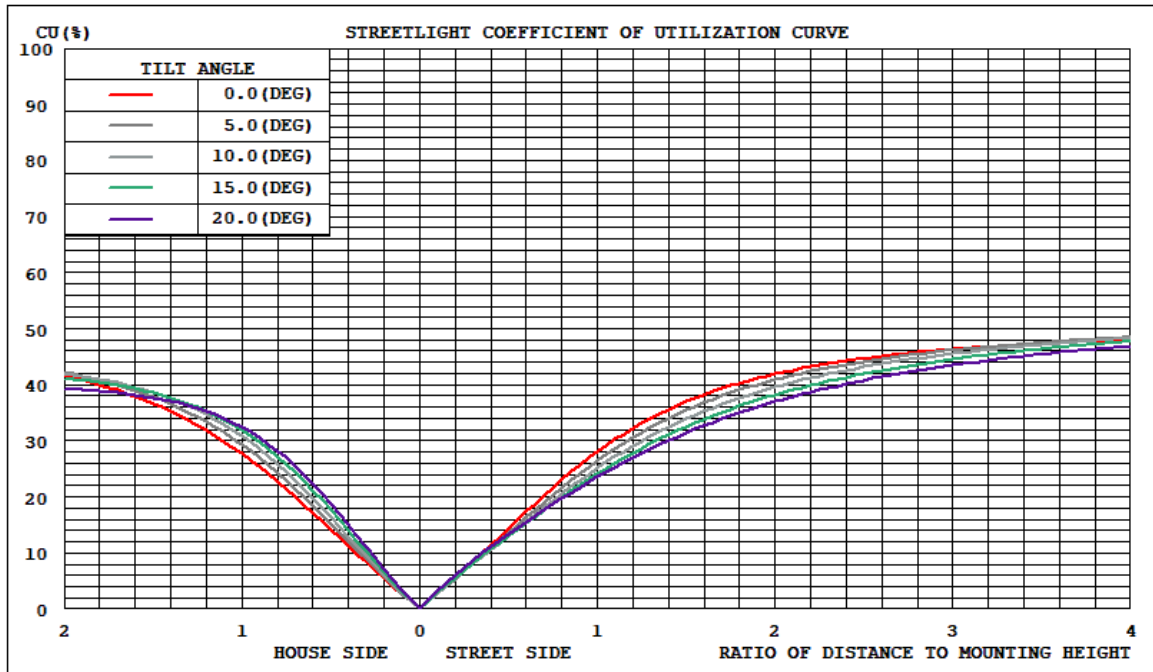
UL - Uplight-Low(90-100)	0	0.0
UH - Uplight-High(100-180)	0	0.0
Total Up Light	0	0.0

BUG(Back,Up,Glare) Rating	B2-U0-G2
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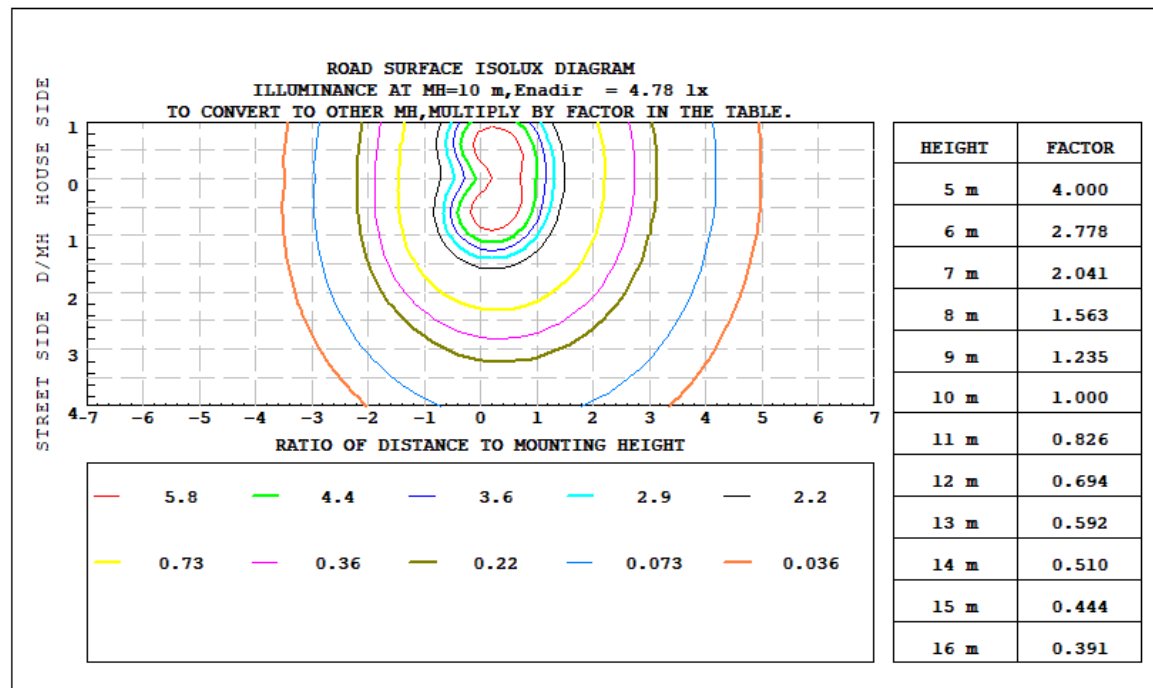
Zone	Downward Lumens	Upward Lumens	Total Lumens
House Side	2197.2	0	2197.2
Street Side	2502.9	0	2502.9

3.2 Goniophotometer Test

Coefficients of Utilization

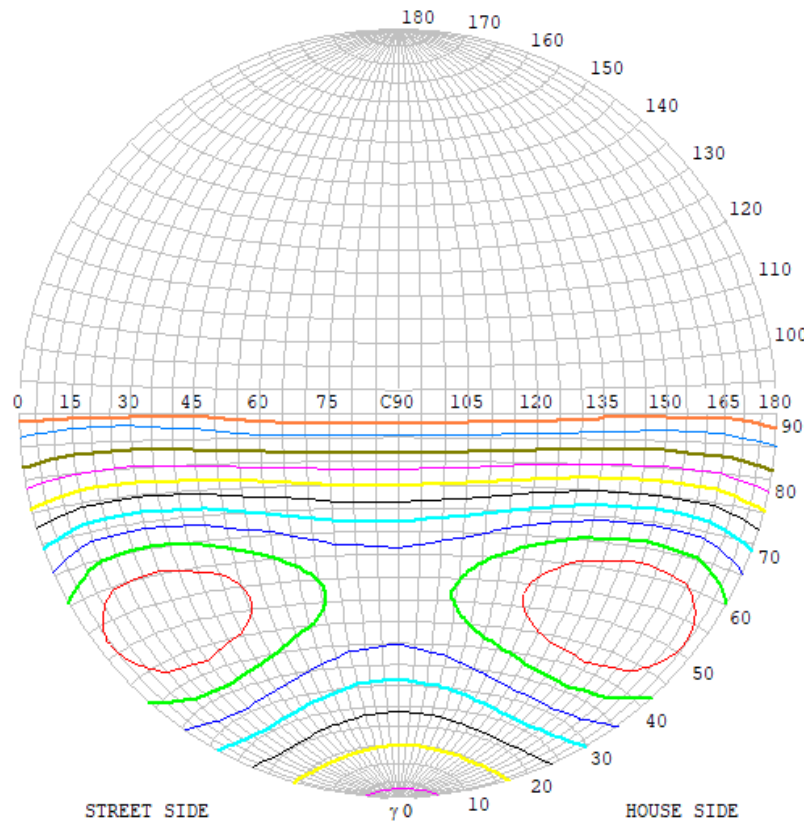


Iso-footcandle Lines of Horizontal Illumination



3.2 Goniophotometer Test

STREETLIGHT ISOCANDELA DIAGRAM

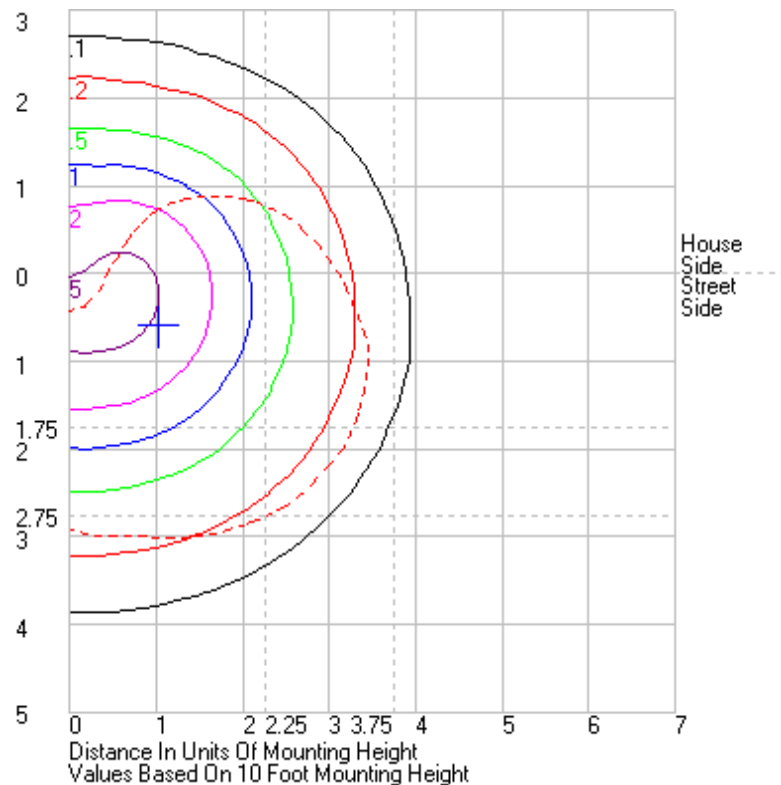


Classification:

IES:Type IV - Short
CIE:Broad - Short
IES:Semi cut-off
CIE:Non-cut-off
Max.At80:110.0cd/klm
Max.At90:0cd/klm
Max.80-90:110.0cd/klm

ISOCANDELA DIAGRAM	
UNIT	cd
Imax=100%	1670
90%	1503
80%	1336
70%	1169
60%	1002
50%	835
40%	668
30%	501
20%	334
10%	167
5%	83

ROAD ISOCANDELA REPORT



5.0 THD and PF Test

Model No.	IVAT2-45L730[H, 4]	Sample ID.	A1
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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

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD
25.1	479.92	60	0.091	42.4	0.973	11.28%

6.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration	Calibration Due Date
DLF107	Integrating Sphere System	2017/12/28	2018/12/27
DLF108	Auxiliary Lamp	2017/12/28	2018/12/27
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-directional	2017/12/28	2018/12/27
DLF116	AC Power Source	2017/12/28	2018/12/27
DLF113	Power Meter	2017/12/28	2018/12/27
DLF112	Temperature Recorder	2017/12/28	2018/12/27
DLF114	Temperature & Humidity Datalogger	2017/12/28	2018/12/27
DLF101	Goniophotometer	2017/12/28	2018/12/27
DLF125	Standard Lamp Standard Lamp Type: 76.58 V, 6.7875 A, Tungsten, Omni-directional	2017/12/28	2018/12/27
DLF104	AC Power Source	2017/12/28	2018/12/27
DLF507	DC Power Source	2017/12/28	2018/12/27
DLF102	Power Meter	2017/12/28	2018/12/27
DLF111	Temperature & Humidity Datalogger	2017/12/28	2018/12/27
DLF119	Power Meter	2017/12/28	2018/12/27
DLF031	Temperature data logger	2017/12/28	2018/12/27
DLF022	Digital power meter	2017/12/28	2018/12/27
DLF003	Temperature & Humidity Datalogger	2017/12/28	2018/12/27

***** End of Test Report*****