

# Photometric Test Report

## Relevant Standards

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

## 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

**DLF1811113**

## Data Number

**DLF1811113-21a**

## Test Date

**2018/11/22**

## Issue Date

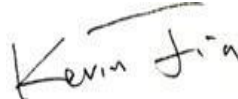
**2018/11/23**

## 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 v4.4

<b>Outdoor - High output Outdoor Pole/Arm-Mounted Area and Roadway Luminaires</b>			
Requirement Category	Test Method	Requirements	Test value
Lamp Output (lm)	IES LM-79-2008	10000	14456
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	120	123.9
Zonal Lumen Requirement (0°-90°)	IES LM-79-2008	≥99%	100.00%
Zonal Lumen Requirement (80°-90°)	IES LM-79-2008	≤10%	3.07%
Allowable CCTs* (K)	IES LM-79-2008	≤5700	3910
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	≥65	72.2
Power Factor	ANSI C82.77:2014	0.873	0.935
Total Harmonic Distortion (A%)	ANSI C82.77:2014	25.00%	6.37%

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2018/11/22	IVAT4-130L740[H, 4]	U1
2	Goniophotometer Test	2018/11/22	IVAT4-130L740[H, 4]	U1
3	THD and PF Test	2018/11/22	IVAT4-130L740[H, 4]	U1

### Remark(If any)

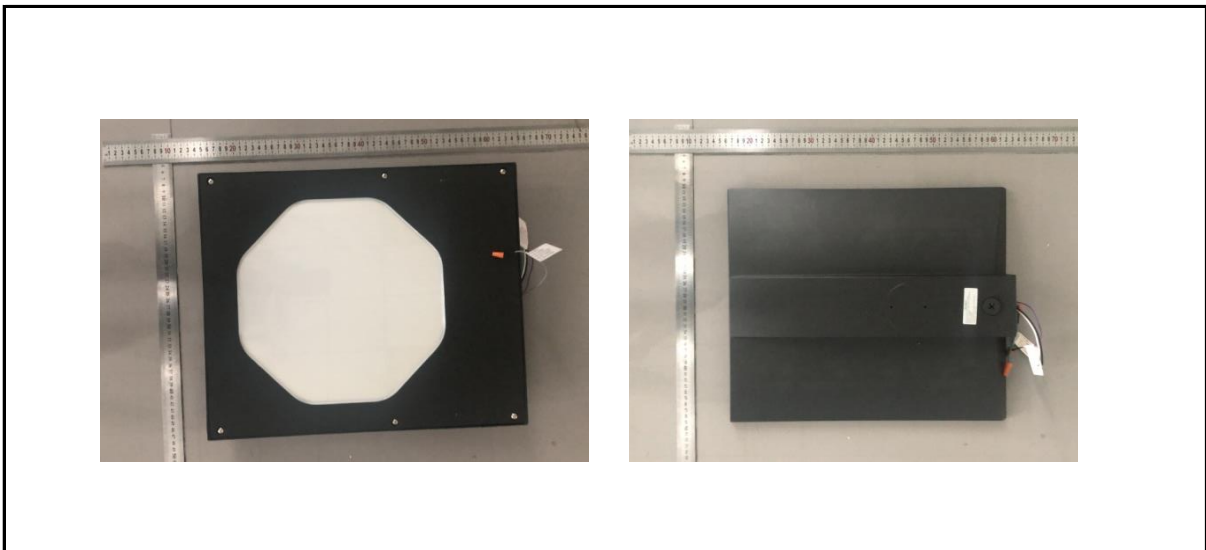
- 1、 This report shall not be used by the client to claim product endorsement by NVLAP, NIST or any agency of the US government.
- 2、 The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without 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:** IVAT4-130L740[H, 4]

**Electrical Specification:** 480V,50/60HZ, 130W

#### Photos of Luminaire Characteristics



## 4.0 LM-79 Measurement and Test Results

### 4.1 Integrating Sphere Test

Model No.	IVAT4-130L740[H, 4]	Sample ID.	U1
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  $\pm 0.2$  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 Conditions

Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
25.3	480.03	60	0.261	116.9	0.935

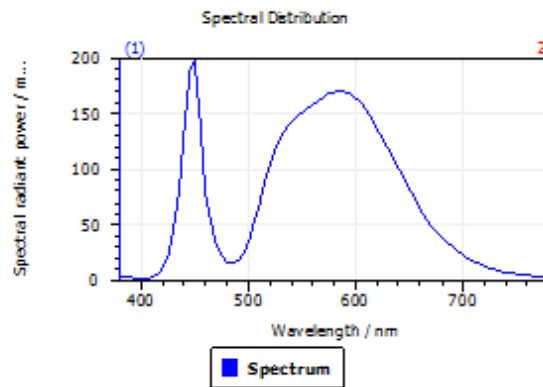
#### Test Result

CCT (K)	CRI (Ra)	Duv
3910	72.2	1.3E-04

## 4.1 Integrating Sphere Test

### Spectroradiometric Parameters

#### Results



#### Spectral values

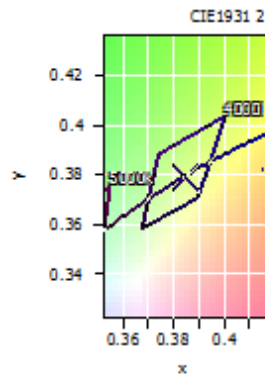
DominantWavelength	579.48 nm
Purity	0.291
PeakWavelength	448.21 nm
Radiant Power	28.65 W
Width50%	21.69 nm

#### Color Coordinates

Correlated Color Temperatu 3910 K

x: 0.3844 u: 0.2269 u': 0.2269  
y: 0.3789 v: 0.3354 v': 0.5031

ResultsCRICRI01	70.6	ResultsCRICRI09	-16.7
ResultsCRICRI02	77.6	ResultsCRICRI10	45.5
ResultsCRICRI03	81.6	ResultsCRICRI11	67.3
ResultsCRICRI04	72.3	ResultsCRICRI12	38.1
ResultsCRICRI05	69.4	ResultsCRICRI13	71.1
ResultsCRICRI06	67.7	ResultsCRICRI14	89.1
ResultsCRICRI07	81.5	ResultsCRICRI15	65.3
ResultsCRICRI08	57.2	ResultsCRICRI16	67.7
ResultsCRI	72.2		



PlanckDistance 1.3E-004

## 4.0 LM-79 Measurement and Test Results

### 4.3 Goniophotometer Test

Model No.	IVAT4-130L740[H, 4]	Sample ID.	U1
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  $\pm 0.2$  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

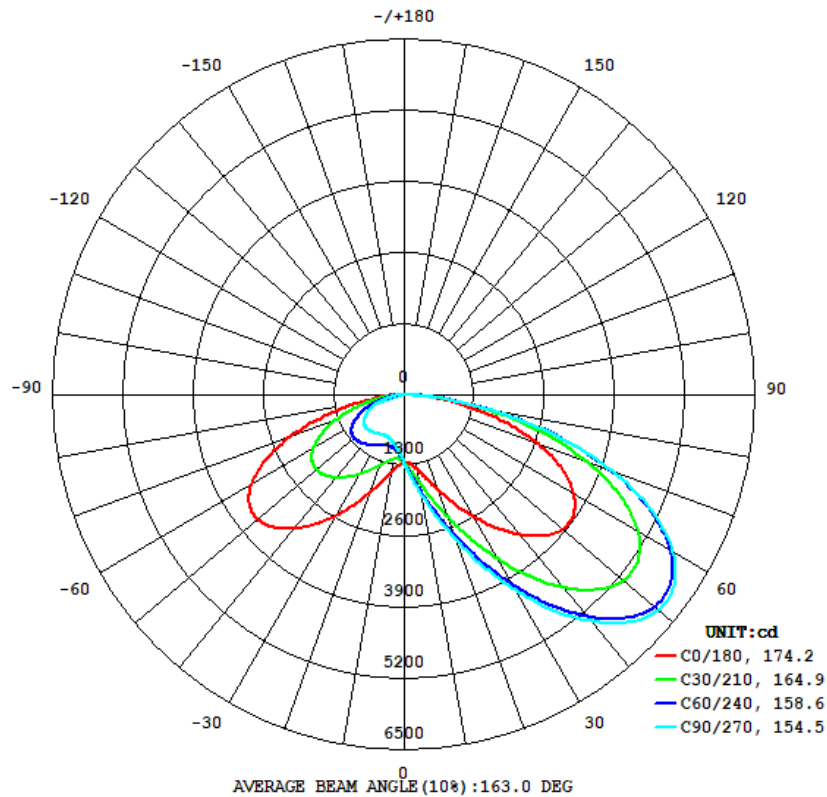
Temperature ( $^{\circ}\text{C}$ )	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
25.1	479.96	60	0.260	116.7	0.935	Light Down

#### Test Result

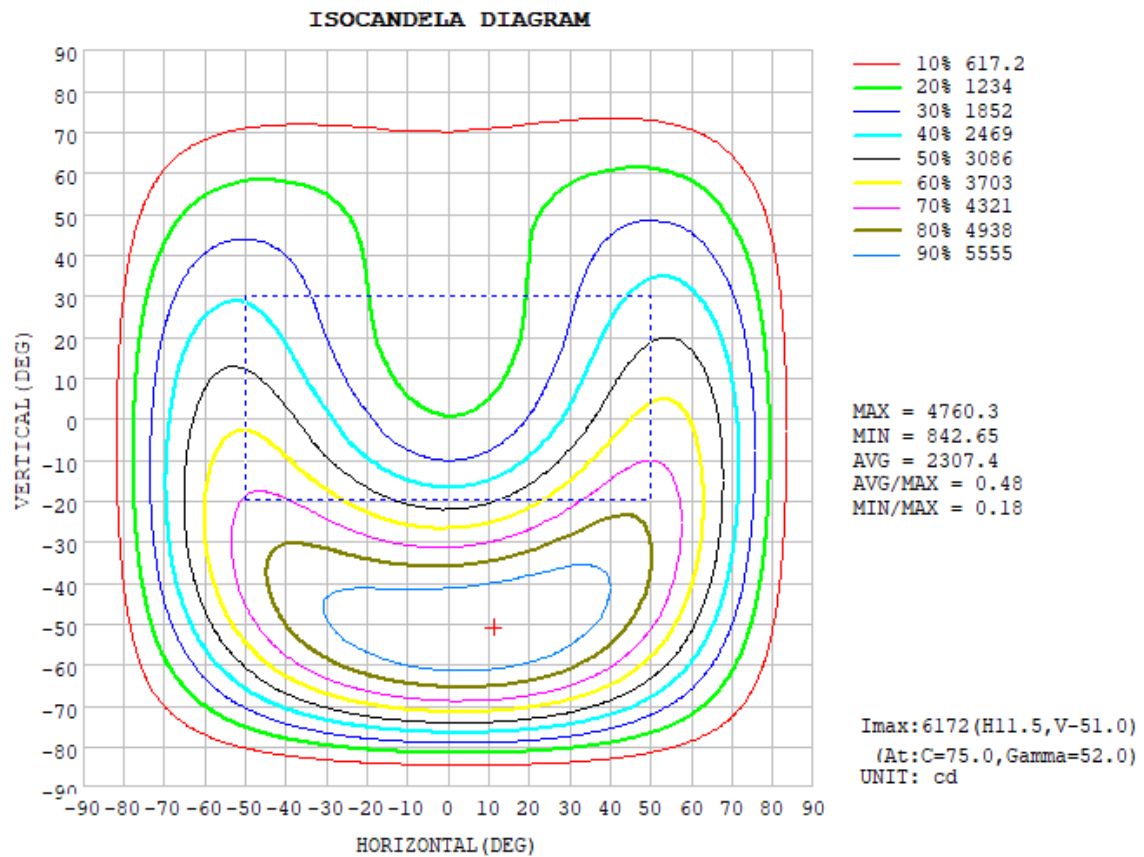
Flux (lm)	Zonal Lumen Requirement ( $0^{\circ}$ - $90^{\circ}$ )	Zonal Lumen Requirement ( $80^{\circ}$ - $90^{\circ}$ )	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
			Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	
14456	100.00%	3.07%	174.2	154.5	164.9	52.2	123.9

### 4.3 Goniophotometer Test

#### Light Distrubtion Curve



#### Isolux Plot



### 4.3 Goniophotometer Test

#### Zonal Lumen Summary

DEG	C0	C45	C90	C135	C180	C225	C270	C315
180	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0
80	1130	1619	1658	1444	834.4	398.1	249.4	468.3
70	2652	3930	4094	3633	2255	1016	608.7	1136
60	3638	5458	5742	5109	3267	1447	855.9	1578
50	3832	5783	6133	5440	3554	1603	941.1	1704
40	3357	5048	5407	4789	3203	1522	910.6	1568
30	2578	3794	4117	3672	2557	1334	855.3	1330
20	1858	2579	2818	2569	1914	1165	852.7	1142
10	1389	1708	1828	1728	1444	1104	955.7	1085
0	1389	1708	1828	1728	1444	1104	955.7	1085



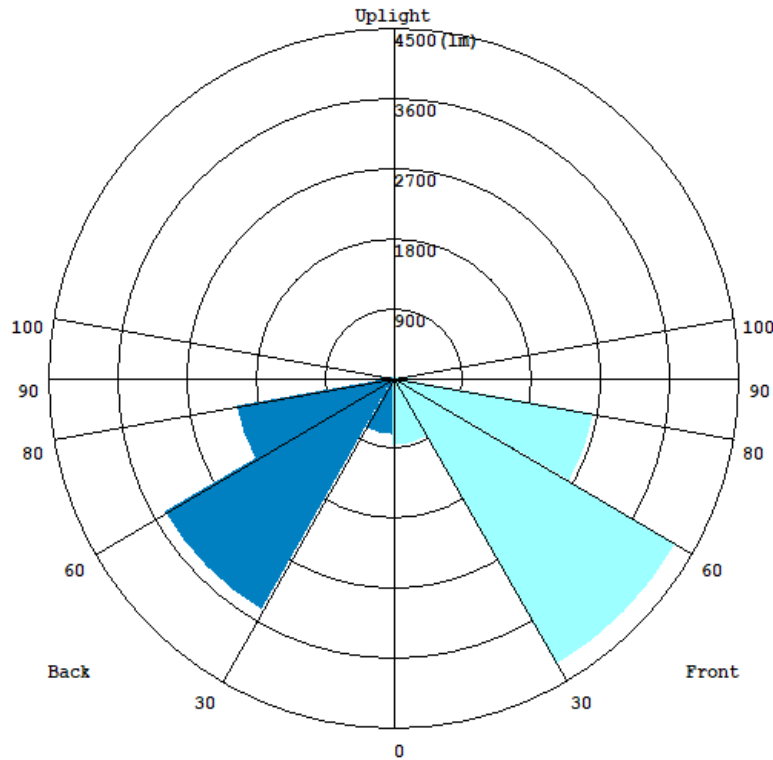
### 4.3 Goniophotometer Test

#### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	126.49	0 - 10	126.49	0.87%
10-20	463.32	0 - 20	589.81	4.08%
20-30	1019.10	0 - 30	1608.91	11.13%
30-40	1818.18	0 - 40	3427.09	23.71%
40-50	2679.09	0 - 50	6106.18	42.24%
50-60	3185.44	0 - 60	9291.62	64.27%
60-70	2917.74	0 - 70	12209.36	84.46%
70-80	1802.61	0 - 80	14011.97	96.93%
80-90	444.37	0 - 90	14456.34	100.00%
90-100	0.00	0 - 100	14456.34	100.00%
100-110	0.00	0 - 110	14456.34	100.00%
110-120	0.00	0 - 120	14456.34	100.00%
120-130	0.00	0 - 130	14456.34	100.00%
130-140	0.00	0 - 140	14456.34	100.00%
140-150	0.00	0 - 150	14456.34	100.00%
150-160	0.00	0 - 160	14456.34	100.00%
160-170	0.00	0 - 170	14456.34	100.00%
170-180	0.00	0 - 180	14456.34	100.00%

### 3.2 Goniophotometer Test

#### LCS Graph



#### BUG-Rating

IESNA Luminaire Flux Distribution Table:

Zone	Lumens	Luminaire %
FL - Front-Low(0-30)	872.53	6.0
FM - Front-Medium(30-60)	4264.1	29.5
FH - Front-High(60-80)	2656.7	18.4
FVH - Front-Very High(80-90)	241.26	1.7
Total Forward Light	8034.7	55.5

BL - Back-Low(0-30)	738.06	5.1
BM - Back-Medium(30-60)	3445.7	23.8
BH - Back-High(60-80)	2080.9	14.4
BVH - Back-Very High(80-90)	171.81	1.2
Total Back Light	6436.4	44.5

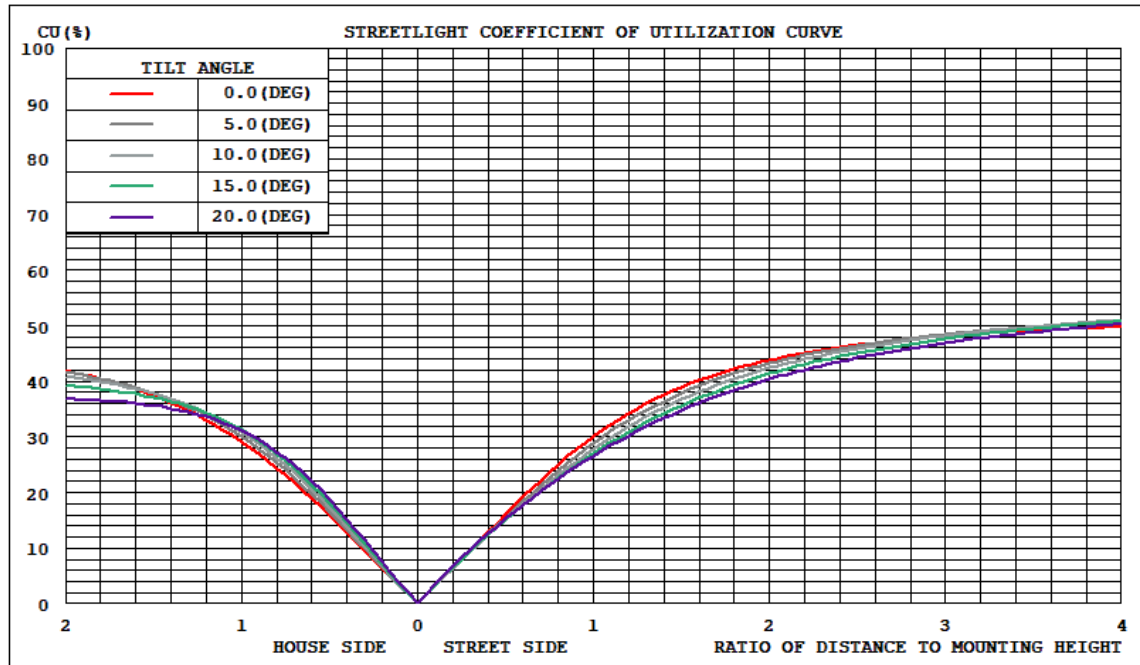
UL - Uplight-Low(90-100)	0	0.0
UH - Uplight-High(100-180)	0	0.0
Total Up Light	0	0.0

BUG(Back,Up,Glare) Rating	B3-U0-G3
---------------------------	----------

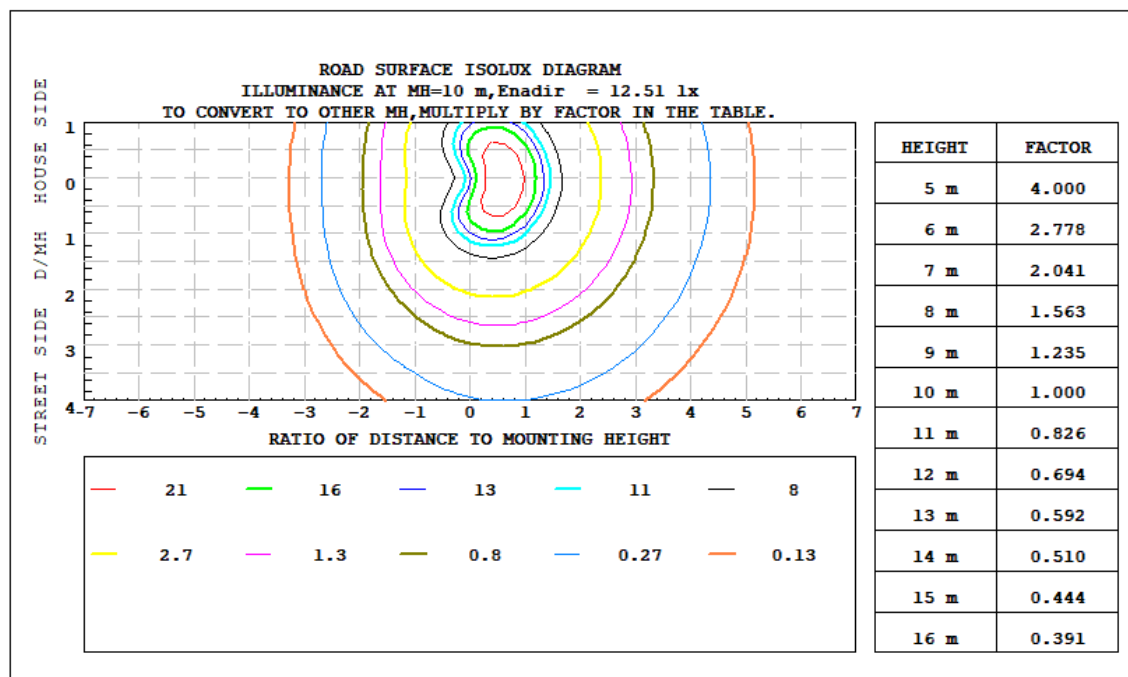
Zone	Downward Lumens	Upward Lumens	Total Lumens
House Side	6436.4	0	6436.4
Street Side	8034.7	0	8034.7

### 3.2 Goniophotometer Test

#### Coefficients of Utilization

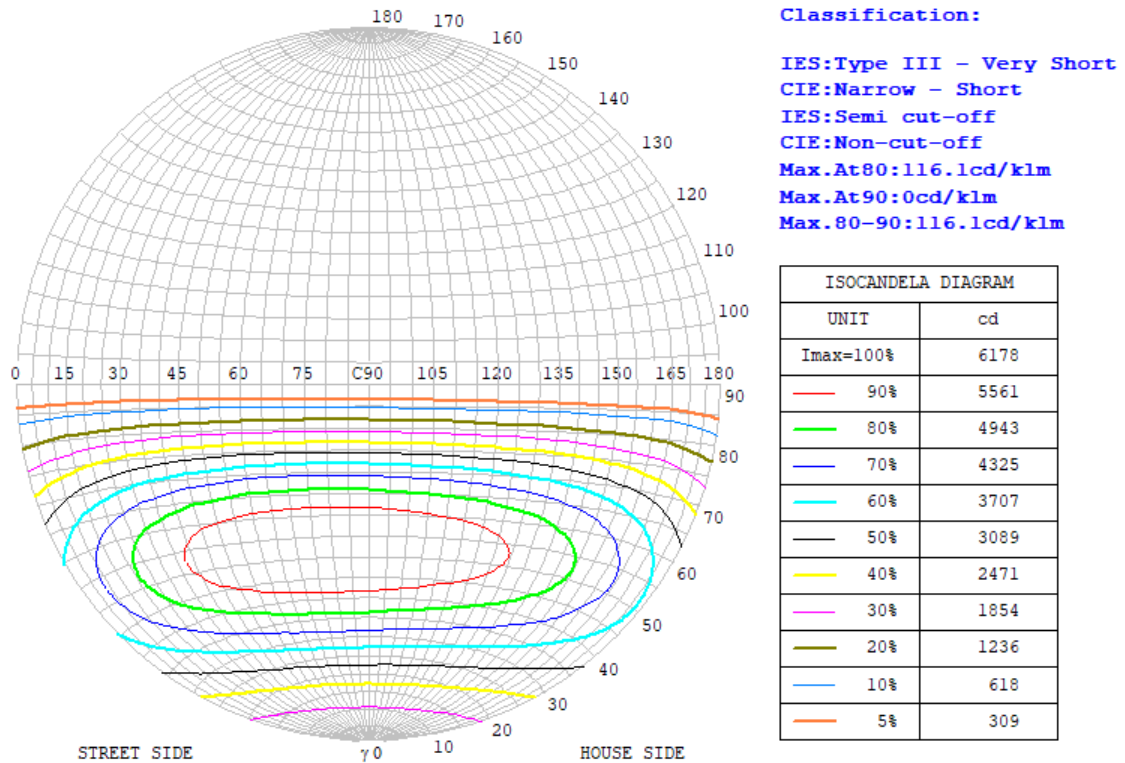


#### Iso-footcandle Lines of Horizontal Illumination

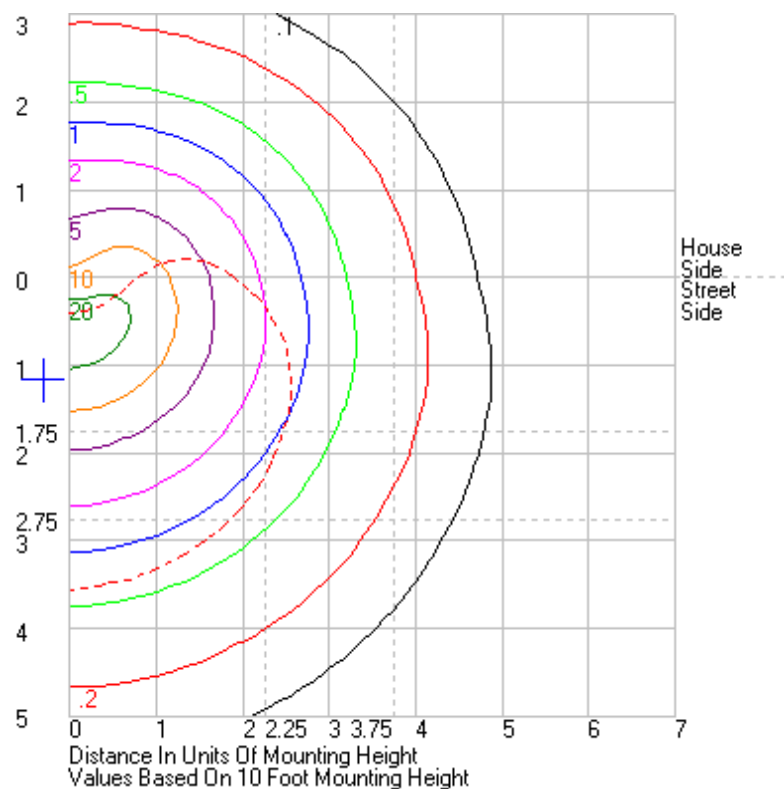


### 3.2 Goniophotometer Test

## STREETLIGHT ISOCANDELA DIAGRAM



# ROAD ISOCANDELA REPORT



## 5.0 THD and PF Test

Model No.	IVAT4-130L740[H, 4]	Sample ID.	U1
-----------	---------------------	------------	----

### 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	480.03	60	0.261	116.9	0.935	6.37%

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