

# Photometric Test Report

## Relevant Standards

- ☒ IES LM-79-2008
- ☒ ANSI C82.77:2014
- ☒ UL1598-2008

## Prepared For RAB Lighting Inc.

Room 6A33, No.1388, Wuzhong road, Shanghai, China

Xiao Xiang, 15921313292, gary@rabweb.com

## Prepared By

Deliver Co., Ltd.

Block 11, 78 Keling Road, SSTP, Suzhou, China

0512-66801950, kevin.jia@szdeliver.com

## Project Number

**DLF1901118**

## Report Number

**DLF1901118-2aREV2**

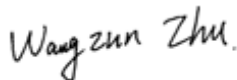
## Test Date

**2019/1/28**

## Issue Date

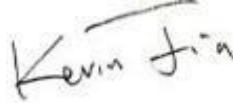
**2019/9/3**

### 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

Outdoor - Pole/Arm-Mounted Area and Roadway Luminaires				
Requirement Category (Test Data Source)	Test Method	Requirements		Test value
Luminaire Output (lm) (Goniophotometer - Section 4.2)	IES LM-79-2008	1000		7485
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	standard 92.15	Premium 111.55	116.2
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		64.4
Total Harmonic Distortion (A%) (THD & PF - Section 4.3)	ANSI C82.77:2014	25.00%	120V	12.81%
	ANSI C82.77:2014	25.00%	277V	14.93%
Power Factor (THD & PF - Section 4.3)	ANSI C82.77:2014	0.873	120V	0.988
	ANSI C82.77:2014	0.873	277V	0.918
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	5700		3839
Minimum CRI (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	65		70
Zonal Lumen Requirement (0°-90°) (Goniophotometer - Section 4.2)	IES LM-79-2008	≥99%		100.00%
Zonal Lumen Requirement (80°-90°) (Goniophotometer - Section 4.2)	IES LM-79-2008	≤13%		3.73%
Input Voltage (V)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		120
(THD & PF - section 4.3)		Non-Wrost Case		277
Input Current (A)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		0.544
(THD & PF - section 4.3)		Non-Wrost Case		0.255
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		64.4
(THD & PF - section 4.3)		Non-Wrost Case		64.8

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2019/1/28	IVAT3-75L740U	A2
2	Goniophotometer Test	2019/1/28	IVAT3-75L740U	A2
3	THD and PF Test	2019/1/28	IVAT3-75L740U	A2

### Remark(If any)

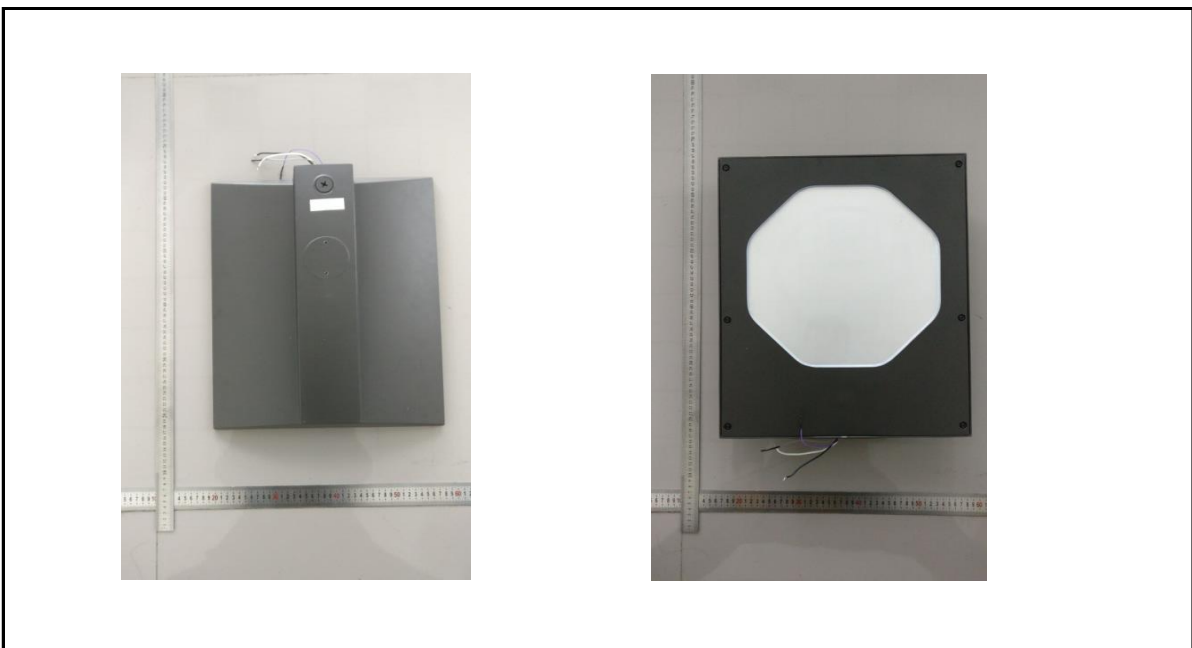
- 1、 This report shall not be used by the client to claim product endorsement by NVLAP, NIST or any agency of the US government.
- 2、 The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without 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:** IVAT3-75L740U

**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.	IVAT3-75L740U	Sample ID.	A2
Operate time (Min.)	10	Stabilization time (Min.)	30
Temperature (°C)	24.6	Humidity (%RH)	49.0

#### 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.

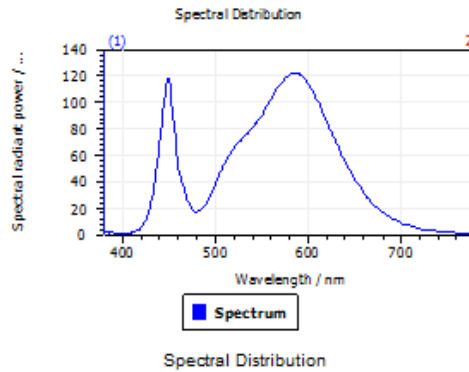
The sample was measured using  $4\pi$  geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

#### Test Result

Voltage (V)	CCT (K)	CRI	Duv
120.01	3839	70	2.0E-03

## 4.1 Integrating Sphere Test

### Results



#### Spectral values

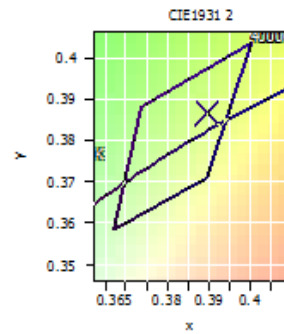
DominantWavelength	578.71 nm
Purity	0.329
PeakWavelength	585.27 nm
Width50%	120.61 nm

#### Color Coordinates

Correlated Color Temperature 3839 K  
 x: 0.3895 u: 0.2271 u': 0.2271  
 y: 0.3866 v: 0.3381 v': 0.5072

CRI01	66.1	CRI09	-47.6
CRI02	79.8	CRI10	54.0
CRI03	91.3	CRI11	63.6
CRI04	67.6	CRI12	46.3
CRI05	66.5	CRI13	68.8
CRI06	72.0	CRI14	95.3
CRI07	78.2	CRI15	56.9
CRI08	43.8	CRI16	56.5

ResultsCRI 70.7



PlanckDistance 2.0E-003

## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

Model No.	IVAT3-75L740U	Sample ID.	A2
Opreate time (Min.)	90	Stabilization time (Min.)	45
Temperature (°C)	24.6	Humidity (%RH)	49.0

#### 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° C ± 1° 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

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
120.01	60	0.544	64.4	0.987	Light Down

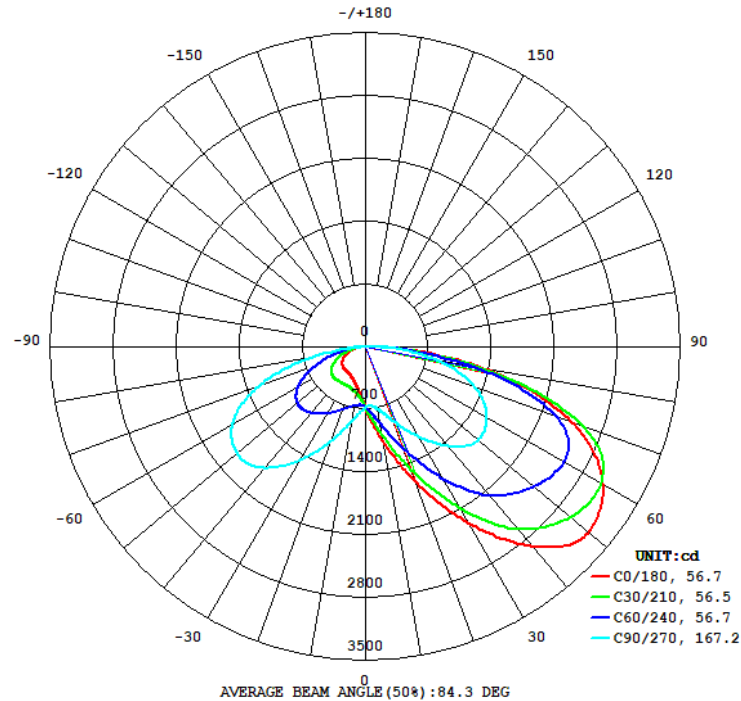
#### Test Result

Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
7485	140.7	177.7	56.7	167.2	116.2

Zonal Lumen Requirement (0°-90°)	Zonal Lumen Requirement (80°-90°)
100.00%	3.73%

## 4.2 Goniophotometer Test

### Light Distrubtion Curve

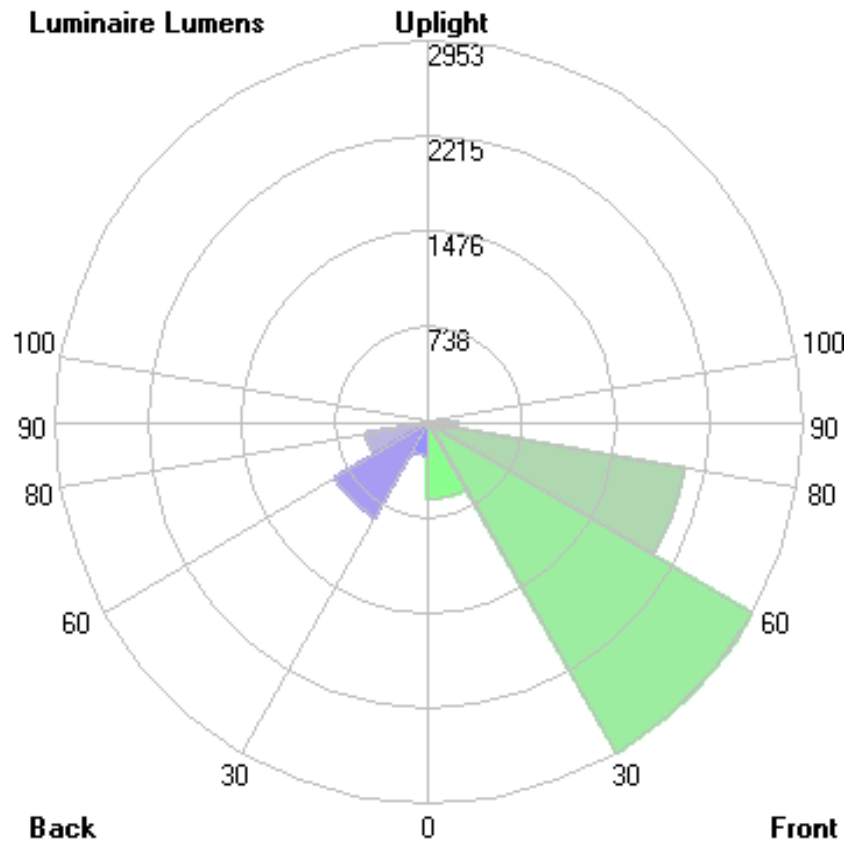


### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	68.98	0 - 10	68.98	0.92%
10-20	249.72	0 - 20	318.70	4.26%
20-30	534.36	0 - 30	853.06	11.40%
30-40	922.78	0 - 40	1775.84	23.73%
40-50	1312.13	0 - 50	3087.97	41.26%
50-60	1567.66	0 - 60	4655.63	62.20%
60-70	1531.94	0 - 70	6187.57	82.67%
70-80	1018.02	0 - 80	7205.59	96.27%
80-90	279.31	0 - 90	7484.90	100.00%
90-100	0	0 - 100	7484.90	100.00%
100-110	0	0 - 110	7484.90	100.00%
110-120	0	0 - 120	7484.90	100.00%
120-130	0	0 - 130	7484.90	100.00%
130-140	0	0 - 140	7484.90	100.00%
140-150	0	0 - 150	7484.90	100.00%
150-160	0	0 - 160	7484.90	100.00%
160-170	0	0 - 170	7484.90	100.00%
170-180	0	0 - 180	7484.90	100.00%

## 4.2 Goniophotometer Test

LCS Graph



BUG RATING

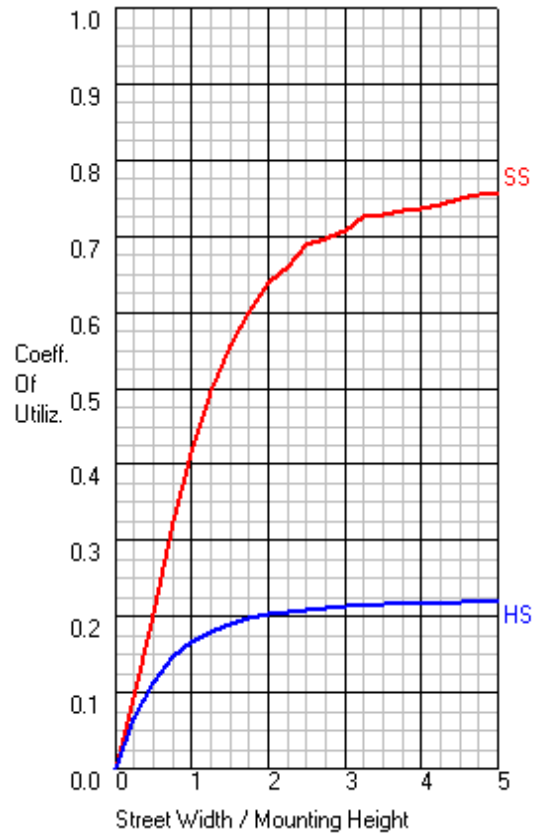
### LUMINAIRE CLASSIFICATION SYSTEM (LCS)

	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	594.1	N.A.	7.9
FM - Front-Medium (30-60)	2952.8	N.A.	39.5
FH - Front-High (60-80)	2052.1	N.A.	27.4
FVH - Front-Very High (80-90)	222.1	N.A.	3.0
BL - Back-Low (0-30)	258.9	N.A.	3.5
BM - Back-Medium (30-60)	849.8	N.A.	11.4
BH - Back-High (60-80)	497.8	N.A.	6.7
BVH - Back-Very High (80-90)	57.2	N.A.	0.8
UL - Uplight-Low (90-100)	0.0	N.A.	0.0
UH - Uplight-High (100-180)	0.0	N.A.	0.0
Total	7484.8	N.A.	100.0
BUG Rating	B1-U0-G2		

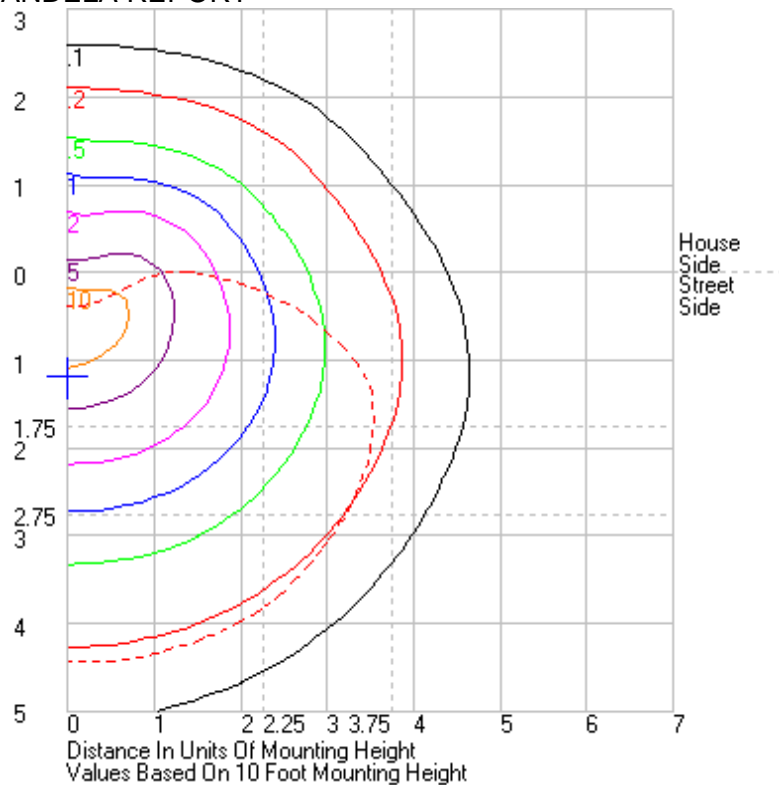


### 4.3 Goniophotometer Test

#### Coefficients of Utilization



#### ROAD ISOCANDELA REPORT



**CANDELA TABULATION**

Vert. Angles	Horizontal Angles									
	0	5	10	15	20	25	30	35	40	45
0	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53
5	834.42	830.97	826.17	821.72	814.94	808.10	799.44	791.14	781.94	772.66
10	1038.35	1032.57	1020.54	1010.27	996.73	982.61	966.24	948.12	929.00	909.09
15	1285.16	1274.81	1260.61	1245.24	1227.35	1206.47	1183.22	1155.86	1127.07	1097.92
20	1577.95	1563.91	1544.07	1521.97	1497.13	1469.16	1436.28	1402.82	1364.57	1324.10
25	1907.63	1888.92	1864.62	1840.15	1809.73	1776.76	1738.17	1696.03	1647.88	1598.69
30	2253.12	2234.13	2205.62	2179.01	2145.48	2107.91	2064.59	2014.91	1958.77	1898.72
35	2598.93	2576.98	2546.23	2515.01	2479.18	2437.00	2384.84	2330.03	2266.73	2199.15
40	2912.20	2884.29	2852.46	2818.64	2777.82	2725.34	2662.07	2595.27	2519.96	2442.69
45	3141.99	3114.04	3066.17	3020.03	2963.64	2906.59	2841.03	2767.65	2692.46	2610.59
50	3230.63	3203.96	3162.44	3117.02	3068.69	3018.07	2961.01	2897.90	2826.07	2745.77
55	3184.45	3160.52	3143.82	3128.55	3101.88	3071.87	3035.15	2986.75	2923.83	2848.00
60	3051.06	3026.84	3020.72	3037.57	3044.38	3040.90	3029.53	3000.87	2956.60	2892.01
65	2803.21	2791.15	2795.56	2819.31	2863.42	2889.61	2901.05	2892.10	2859.70	2808.24
70	2428.31	2426.92	2437.95	2472.05	2506.94	2544.06	2554.39	2545.16	2520.14	2477.56
75	1910.23	1913.86	1925.04	1941.72	1954.49	1968.58	1967.50	1948.59	1926.35	1896.41
80	1266.44	1273.28	1264.46	1249.42	1232.07	1219.37	1205.39	1186.53	1167.60	1148.52
85	532.80	566.45	556.10	531.74	517.86	510.95	506.40	501.05	496.73	492.37
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Vert. Angles	Horizontal Angles									
	50	55	60	65	70	75	80	85	90	95
0	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53
5	761.44	750.67	739.63	728.06	714.71	704.07	692.57	680.89	669.01	657.91
10	887.64	865.96	842.80	819.40	794.00	770.98	746.58	723.57	698.87	675.78
15	1064.46	1029.90	994.22	958.66	919.15	882.53	844.07	806.91	768.08	732.01
20	1280.94	1239.77	1193.31	1143.22	1088.89	1036.46	982.68	928.69	873.67	820.27
25	1544.46	1484.28	1421.22	1355.78	1294.30	1224.40	1151.90	1079.33	1004.72	933.45
30	1832.40	1761.09	1682.95	1601.13	1522.76	1434.21	1341.89	1248.22	1153.07	1060.06
35	2119.71	2035.10	1946.74	1849.95	1757.67	1649.39	1538.80	1423.67	1306.70	1192.29
40	2358.37	2269.31	2175.15	2074.18	1974.02	1851.86	1723.48	1591.37	1454.74	1320.31
45	2520.91	2422.37	2320.90	2214.12	2109.34	1986.98	1859.04	1724.70	1574.65	1425.44
50	2652.34	2547.37	2432.85	2307.96	2192.80	2056.03	1918.97	1778.56	1630.10	1486.79
55	2753.08	2644.41	2518.53	2381.88	2246.15	2089.26	1932.13	1775.22	1622.09	1475.40
60	2798.09	2686.65	2556.49	2406.53	2256.77	2083.46	1907.48	1730.62	1562.12	1406.03
65	2726.11	2624.61	2500.99	2350.52	2189.43	2006.01	1818.24	1633.88	1454.59	1289.09
70	2416.06	2340.64	2247.50	2127.28	1991.92	1826.46	1646.41	1464.59	1289.81	1127.51
75	1857.29	1815.65	1760.12	1693.41	1610.55	1494.60	1354.78	1201.64	1050.11	905.09
80	1131.85	1116.40	1103.36	1083.18	1060.17	1009.61	940.32	847.50	741.16	630.60

**CANDELA TABULATION - (Cont.)**

85	487.55	482.10	473.30	469.89	469.57	463.02	456.85	432.87	390.52	335.02
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Vert. Horizontal Angles**

	<u>100</u>	<u>105</u>	<u>110</u>	<u>115</u>	<u>120</u>	<u>125</u>	<u>130</u>	<u>135</u>	<u>140</u>	<u>145</u>
0	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53
5	647.21	637.36	627.98	617.77	610.06	601.82	593.75	587.35	591.46	574.89
10	653.74	632.34	613.50	592.77	579.17	562.43	546.91	533.26	520.91	510.89
15	696.22	661.74	630.13	599.22	575.79	549.26	524.81	503.64	484.32	468.65
20	768.53	719.14	673.02	628.80	593.51	556.17	522.71	493.35	467.43	445.95
25	863.10	796.34	733.70	675.62	626.90	577.32	533.47	495.10	462.35	435.20
30	970.98	886.26	805.55	731.33	668.71	607.01	551.99	505.74	465.04	432.47
35	1082.30	978.01	881.87	790.84	713.90	640.28	575.68	520.36	473.82	435.27
40	1189.85	1066.19	953.02	847.07	759.35	675.03	601.96	538.71	485.38	441.83
45	1280.23	1139.61	1011.99	894.36	796.40	703.90	624.03	554.43	496.56	449.41
50	1334.50	1186.89	1049.30	922.93	818.04	719.83	634.62	562.23	500.94	451.66
55	1330.70	1189.46	1050.69	922.00	813.81	714.39	628.10	554.74	492.66	442.52
60	1265.36	1129.19	1007.09	882.78	777.84	681.61	597.61	526.59	466.65	417.44
65	1145.41	1017.58	904.40	800.42	705.77	617.47	540.49	475.11	420.07	374.98
70	982.57	861.64	760.55	672.68	598.18	522.43	456.74	400.81	353.74	314.56
75	776.00	667.22	579.59	517.65	458.05	403.03	351.38	307.53	270.05	239.51
80	530.17	451.74	392.86	344.79	303.99	267.06	232.31	202.27	176.50	155.32
85	276.96	233.04	201.58	176.00	153.59	132.99	114.67	97.57	83.32	72.23
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



**CANDELA TABULATION - (Cont.)**

Vert. Angles	Horizontal Angles									
	<u>150</u>	<u>155</u>	<u>160</u>	<u>165</u>	<u>170</u>	<u>175</u>	<u>180</u>	<u>185</u>	<u>190</u>	<u>195</u>
0	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53
5	570.01	571.08	569.49	565.79	564.85	566.97	567.93	570.70	573.80	578.58
10	501.66	494.85	489.52	486.20	485.15	484.74	489.34	494.13	499.64	508.82
15	454.83	444.31	436.85	430.51	428.26	428.07	436.24	441.71	449.64	461.34
20	427.39	413.13	402.40	394.72	390.82	390.26	400.55	406.57	416.46	430.52
25	412.43	394.91	381.22	371.74	366.90	365.80	377.87	384.19	395.09	411.18
30	405.19	384.34	368.59	357.68	351.84	350.04	363.51	370.57	382.02	399.55
35	403.85	379.71	362.05	349.72	342.54	340.46	355.04	362.45	374.95	394.00
40	406.59	379.33	359.25	345.15	337.50	334.72	349.88	357.81	371.14	391.51
45	410.73	380.69	358.45	342.36	333.16	329.81	344.46	352.58	367.10	388.48
50	410.56	378.43	354.74	337.30	326.99	322.57	334.89	343.19	358.04	379.75
55	400.88	368.24	343.89	325.30	314.03	309.45	318.97	326.58	340.32	361.47
60	378.02	345.60	321.38	303.39	292.30	287.18	292.10	298.88	310.99	330.02
65	337.95	308.74	286.07	269.35	258.81	253.66	253.66	258.84	269.08	284.89
70	282.89	257.49	238.00	223.31	213.60	209.24	203.98	207.38	214.95	227.13
75	214.60	194.66	179.03	167.09	159.23	154.89	145.08	147.15	151.83	160.03
80	138.27	124.57	113.85	105.45	99.78	96.43	83.54	83.37	84.95	88.49
85	63.56	56.26	51.48	47.39	44.59	42.21	29.57	29.11	28.96	29.36
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Vert. Angles	Horizontal Angles									
	<u>200</u>	<u>205</u>	<u>210</u>	<u>215</u>	<u>220</u>	<u>225</u>	<u>230</u>	<u>235</u>	<u>240</u>	<u>245</u>
0	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53
5	584.84	591.14	598.72	607.24	616.80	626.76	637.33	648.97	660.73	672.27
10	519.42	531.26	546.11	562.75	580.65	600.84	622.65	645.84	670.05	695.59
15	475.83	493.21	513.90	537.81	564.80	594.65	627.33	663.32	700.98	740.77
20	448.07	470.11	496.29	527.17	562.07	602.51	646.98	695.12	747.51	803.63
25	431.40	457.37	488.33	526.12	569.11	619.44	674.75	737.02	803.91	876.39
30	422.60	451.73	487.92	531.45	582.36	641.97	708.08	783.13	864.49	952.51
35	418.99	451.41	491.61	540.38	597.90	665.96	742.01	827.18	922.00	1024.51
40	418.54	453.36	496.52	549.63	612.04	685.66	769.41	863.39	967.63	1082.14
45	416.61	452.85	497.53	553.02	618.25	695.60	783.61	883.15	993.28	1115.77
50	408.36	444.43	489.52	544.28	610.06	687.34	775.30	876.23	988.17	1112.39
55	388.95	424.18	466.99	518.87	581.12	655.58	740.00	836.06	943.95	1065.42
60	355.05	387.28	426.46	473.40	529.26	596.42	672.95	761.10	858.16	968.43
65	306.15	333.32	366.56	406.72	452.90	510.64	576.35	650.32	733.09	823.40
70	243.25	264.68	290.16	321.04	357.26	402.53	453.30	510.86	573.88	643.21
75	170.48	184.29	201.57	222.99	248.21	278.91	314.13	353.09	394.93	439.65
80	93.76	100.78	109.65	120.75	135.03	151.98	170.45	191.47	214.21	237.95

**CANDELA TABULATION - (Cont.)**

85	30.28	31.66	33.64	36.06	39.67	45.38	52.20	59.87	67.44	75.91
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Vert. Horizontal Angles**

	<u>250</u>	<u>255</u>	<u>260</u>	<u>265</u>	<u>270</u>	<u>275</u>	<u>280</u>	<u>285</u>	<u>290</u>	<u>295</u>
0	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53
5	684.71	697.92	711.19	724.07	736.32	748.68	760.49	773.01	784.08	794.20
10	720.53	748.24	775.62	802.96	829.78	857.08	883.52	907.29	930.90	953.19
15	781.59	825.87	869.24	914.45	957.53	1001.06	1042.38	1082.86	1121.03	1155.10
20	862.03	923.20	987.15	1050.01	1112.24	1174.65	1234.00	1290.91	1345.25	1395.90
25	952.53	1033.77	1115.61	1200.27	1282.74	1364.36	1445.45	1522.67	1594.65	1661.12
30	1046.82	1146.36	1250.21	1354.08	1460.56	1566.34	1666.64	1764.61	1858.39	1942.31
35	1134.44	1251.94	1374.68	1501.81	1629.08	1756.63	1881.24	1998.54	2110.83	2211.47
40	1205.40	1340.19	1479.90	1626.04	1770.04	1914.88	2055.57	2182.49	2305.24	2416.87
45	1249.02	1393.16	1545.78	1702.75	1855.80	2006.09	2148.35	2287.22	2425.26	2553.01
50	1250.63	1398.03	1553.97	1709.75	1859.43	2020.76	2189.50	2358.62	2523.00	2669.92
55	1204.44	1341.84	1491.21	1643.65	1813.53	1995.43	2183.00	2366.76	2543.24	2702.47
60	1093.84	1222.09	1359.79	1525.25	1704.14	1894.38	2088.09	2278.40	2462.76	2633.84
65	929.91	1044.15	1187.54	1342.19	1514.46	1698.96	1889.21	2073.61	2255.99	2410.60
70	723.04	824.01	948.02	1093.34	1241.63	1405.34	1570.95	1718.66	1836.57	1935.35
75	497.27	571.25	665.92	777.69	896.89	1017.11	1111.81	1171.60	1223.05	1268.80
80	268.90	305.95	362.27	427.17	484.44	501.75	515.33	536.22	561.81	592.79
85	86.57	97.99	114.65	125.08	135.75	145.42	149.56	151.31	155.63	167.69
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



**CANDELA TABULATION - (Cont.)**

Vert. Angles	Horizontal Angles									
	<u>300</u>	<u>305</u>	<u>310</u>	<u>315</u>	<u>320</u>	<u>325</u>	<u>330</u>	<u>335</u>	<u>340</u>	<u>345</u>
0	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53	670.53
5	803.55	812.49	820.10	826.60	832.69	838.72	841.96	844.09	846.71	847.26
10	974.23	990.93	1008.42	1022.04	1034.05	1043.57	1051.19	1056.48	1061.14	1061.79
15	1187.60	1217.45	1240.78	1264.25	1282.22	1297.64	1307.46	1316.12	1320.16	1321.59
20	1442.66	1482.58	1517.91	1549.36	1572.41	1594.17	1607.02	1618.47	1622.69	1622.49
25	1721.46	1775.78	1823.04	1860.83	1893.59	1918.64	1935.07	1947.32	1952.37	1952.21
30	2019.42	2088.85	2144.86	2194.84	2229.60	2262.07	2280.19	2289.04	2297.44	2292.72
35	2301.45	2378.18	2443.37	2499.26	2543.82	2579.49	2601.67	2619.08	2625.02	2620.10
40	2510.42	2593.56	2664.25	2728.95	2776.68	2816.72	2854.72	2875.60	2891.65	2896.83
45	2671.32	2776.26	2861.89	2929.02	2978.03	3014.37	3036.25	3049.84	3058.71	3061.28
50	2804.02	2919.89	3005.20	3077.98	3126.59	3166.35	3182.70	3187.09	3180.15	3161.88
55	2850.43	2971.30	3066.48	3140.51	3183.19	3211.29	3222.60	3217.44	3197.13	3163.79
60	2783.50	2906.14	3001.76	3073.21	3118.07	3142.06	3143.83	3124.33	3082.98	3028.31
65	2532.23	2631.06	2705.26	2764.33	2811.12	2844.72	2861.76	2851.98	2814.30	2748.89
70	2016.32	2086.34	2137.04	2183.39	2227.70	2267.57	2303.64	2322.01	2322.46	2296.41
75	1312.58	1352.19	1385.95	1419.90	1458.09	1499.30	1542.96	1583.52	1612.84	1632.73
80	618.86	644.27	665.06	687.86	711.12	739.45	769.93	798.75	823.95	848.31
85	177.31	186.24	188.87	201.49	212.49	222.44	241.56	259.51	276.09	292.93
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Vert. Angles	Horizontal Angles		
	<u>350</u>	<u>355</u>	<u>360</u>
0	670.53	670.53	670.53
5	846.53	845.49	834.42
10	1059.64	1057.49	1038.35
15	1320.58	1314.67	1285.16
20	1619.24	1612.47	1577.95
25	1946.18	1937.37	1907.63
30	2286.66	2275.13	2253.12
35	2614.01	2603.17	2598.93
40	2896.66	2884.60	2912.20
45	3073.89	3074.54	3141.99
50	3146.94	3124.94	3230.63
55	3124.20	3084.32	3184.45
60	2976.11	2929.71	3051.06
65	2689.44	2649.52	2803.21
70	2264.15	2231.71	2428.31
75	1656.10	1676.15	1910.23
80	896.01	965.59	1266.44

**CANDELA TABULATION - (Cont.)**

85	309.37	332.04	532.80
90	0.00	0.00	0.00
95	0.00	0.00	0.00
100	0.00	0.00	0.00
105	0.00	0.00	0.00
110	0.00	0.00	0.00
115	0.00	0.00	0.00
120	0.00	0.00	0.00
125	0.00	0.00	0.00
130	0.00	0.00	0.00
135	0.00	0.00	0.00
140	0.00	0.00	0.00
145	0.00	0.00	0.00
150	0.00	0.00	0.00
155	0.00	0.00	0.00
160	0.00	0.00	0.00
165	0.00	0.00	0.00
170	0.00	0.00	0.00
175	0.00	0.00	0.00
180	0.00	0.00	0.00

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

Model No.	IVAT3-75L740U	Sample ID.	A2
Temperature (°C)	24.6	Humidity (%RH)	49.0

#### 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

Wrost Case			Non-Wrost Case				
Voltage (Vac)	Power Factor	THD	Voltage (Vac)	Current	Wattage	Power Factor	THD
120.05	0.988	12.81%	277.02	0.255	64.8	0.918	14.93%



## 5.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
DLF107	Integrating Sphere System	2018/12/26	2019/12/25
DLF108	Auxiliary Lamp	2018/12/26	2019/12/25
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-derectional	2018/12/26	2019/12/25
DLF116	AC Power Source	2018/12/26	2019/12/25
DLF113	Power Meter	2018/12/26	2019/12/25
DLF112	Temperature Recorder	2018/12/26	2019/12/25
DLF114	Temperature & Humidity Datalogger	2018/12/26	2019/12/25
DLF101	Goniophotometer	2018/12/26	2019/12/25
DLF125	Standard Lamp Standard Lamp Type: 76.58 V, 6.7875 A, Tungsten, Omni-derectional	2018/12/26	2019/12/25
DLF104	AC Power Source	2018/12/26	2019/12/25
DLF507	DC Power Source	2018/12/26	2019/12/25
DLF102	Power Meter	2018/12/26	2019/12/25
DLF111	Temperature & Humidity Datalogger	2018/12/26	2019/12/25
DLF119	Power Meter	2018/12/26	2019/12/25
DLF031	Temperature data logger	2018/12/26	2019/12/25
DLF022	Digital power meter	2018/12/26	2019/12/25
DLF003	Temperature & Humidity Datalogger	2018/12/26	2019/12/25

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