

# 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

## Project Number

**DLF2110111**

## Report Number

**DLF2110111-6a**

## Test Date

**2021/10/28**

## Issue Date

**2021/11/1**

## 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 v5.1

Outdoor - Architectural Flood and Spot Luminaires				
Requirement Category	Test Method	Requirements		Test value
Luminaire Output (lm) (Goniophotometer - Section 4.2)	IES LM-79-2008	1000		6243
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 105	Premium 120	135.8
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		46.0
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	2.70%
		20.00%	277V	7.35%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.999
		0.9	277V	0.953
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	5029±355	5065
		4 step	5029±220	
Minimum CRI (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥70		82
Minimum R9 (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥-40		1
Minimum Rf (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥70		82
Minimum Rg (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥89		96
Minimum IES Rcs,h1 (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-13%
Zonal Lumen Requirement (0°-90°) (Goniophotometer - Section 4.2)	IES LM-79-2008	85%		99.87%
Input Voltage (V)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		120
(Goniophotometer - Section 4.2)		Non-Worst Case		277
Input Current (A)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		0.384
(Goniophotometer - Section 4.2)		Non-Worst Case		0.172
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		46.0
(Goniophotometer - Section 4.2)		Non-Worst Case		45.3

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2021/10/28	FFLEDS @ 36W / 5000K	F1
2	Goniophotometer Test	2021/10/28	FFLEDS @ 36W / 5000K	F1
3	THD and PF Test	2021/10/28	FFLEDS @ 36W / 5000K	F1

### 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:** FFLEDS @ 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.	FFLEDS @ 36W / 5000K	Sample ID.	F1
Operate time (Min.)	90	Stabilization time (Min.)	45
Temperature (°C)	25.4	Humidity (%RH)	54.0

#### 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 (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.04	60	0.381	45.7	0.999
276.96	60	0.169	44.6	0.953

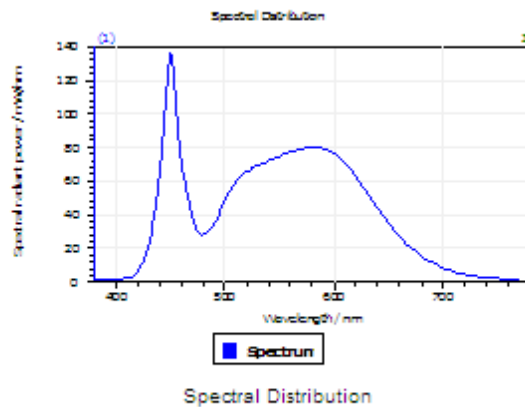
#### Test Result

CCT (K)	CRI	R9	Duv
5065	82	1	0.0025

Rf	Rg	IES Rcs,h1
82	96	-13%

## 4.1 Integrating Sphere Test

### Results



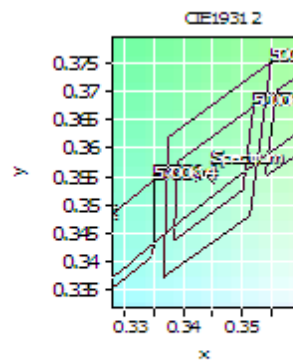
#### Spectral values

DominantWavelength 589.32 nm  
Purity 0.099  
PeakWavelength 450.30 nm  
Radiant Power 15.57 W  
Width50%:

#### Color Coordinates

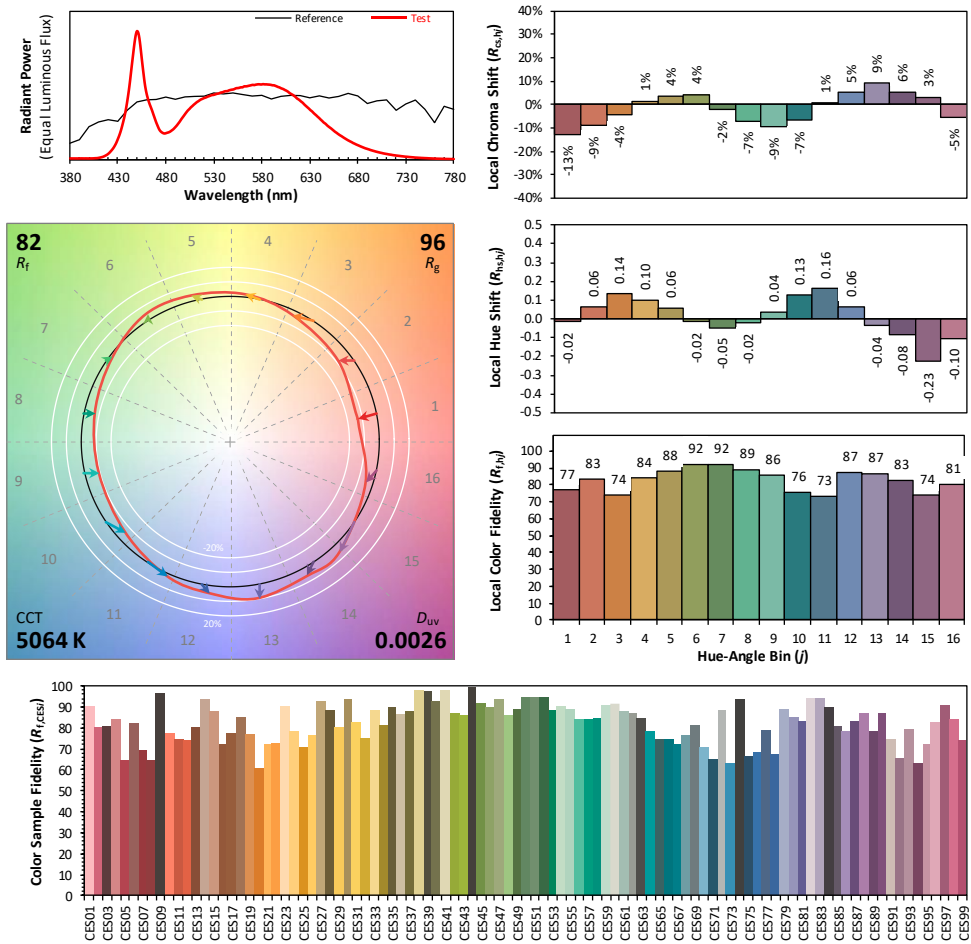
Correlated Color Temperat 5065 K  
x: 0.3438 u: 0.2090 u': 0.2090  
y: 0.3556 v: 0.3243 v': 0.4884  
CRI01 79.8 CRI09 1.4  
CRI02 86.2 CRI10 67.2  
CRI03 90.9 CRI11 81.6  
CRI04 82.2 CRI12 59.9  
CRI05 80.6 CRI13 81.2  
CRI06 80.8 CRI14 95.1  
CRI07 86.3 CRI15 73.8  
CRI08 66.0 CRI16 73.0

ResultsCRI 81.6



PlanckDistance 2.5E-003

## 4.1 Integrating Sphere Test



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

$x$  0.3438  
 $y$  0.3556  
 $u'$  0.2090  
 $v'$  0.4864

CIE 13.3-1995  
(CRI)

$R_a$  81  
 $R_9$  0

lors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.0

## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

Model No.	FFLEDS @ 36W / 5000K	Sample ID.	F1
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  $\pm 0.2$  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

Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
WORST CASE	120.03	60	0.384	46.0	0.999
NON-WORST CASE	277.01	60	0.172	45.3	0.952

#### Test Result

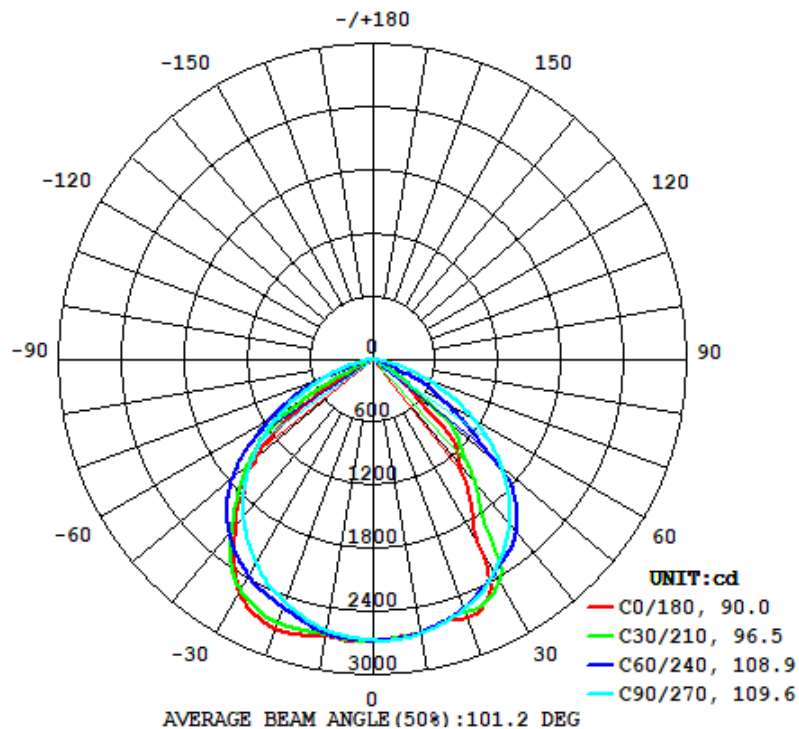
Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
6243	115.3	149.7	90.0	109.6	135.8

Zonal Lumen Requirement  
( $0^{\circ}$ - $90^{\circ}$ )

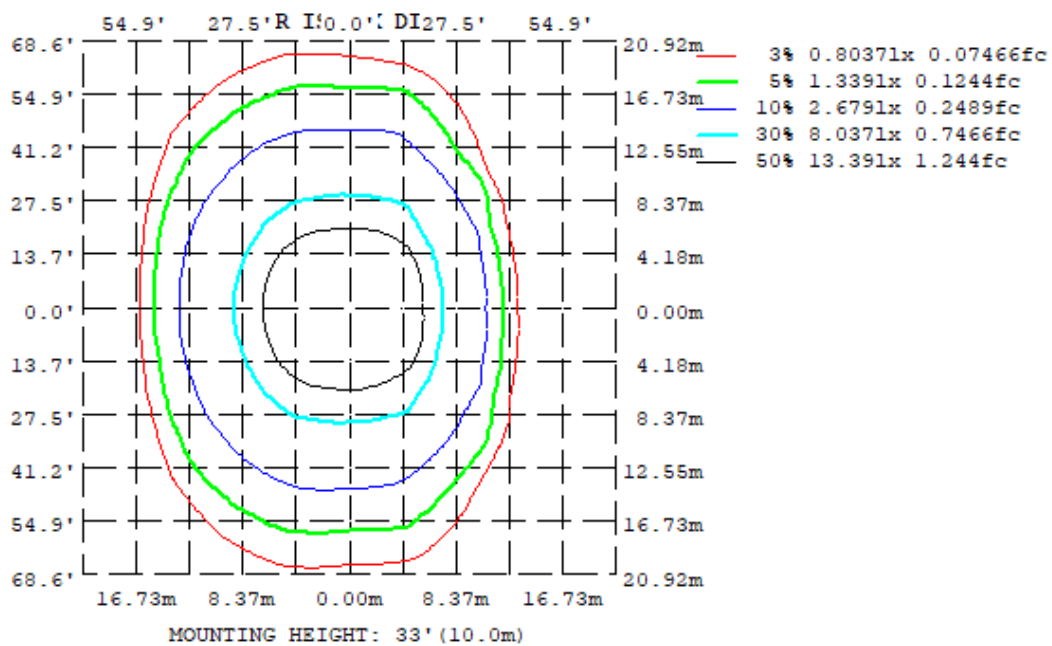
99.87%

## 4.2 Goniophotometer Test

### Light Distrubtion Curve



### Isolux Plot





## 4.2 Goniophotometer Test

### Zonal Lumen Summary

$\gamma$	C0	C45	C90	C135	C180	C225	C270	C315
10	2629	2634	2644	2662	2676	2645	2616	2615
20	2616	2514	2527	2639	2730	2596	2460	2492
30	2019	2438	2328	2545	2554	2490	2233	2391
40	1306	1827	2038	2226	2045	2185	1927	1625
50	527.7	1101	1620	1681	1470	1636	1528	1042
60	29.13	394.6	1105	1081	415.8	1089	1020	304.7
70	0.5451	14.07	544.8	131.7	52.15	160.0	475.1	10.10
80	0.3670	0.4486	100.7	20.19	14.26	17.54	59.82	0.1989
90	0.3611	0.5415	0.3971	0.3028	0.2178	0.4255	0.1563	0.1967
100	0.5503	0.5238	0.5245	1.405	4.565	0.9869	0.5087	0.4302
110	0.5921	0.9098	0.9891	0.5000	0.2799	0.5586	0.9438	0.6812
120	0.9984	1.176	1.084	0.9451	0.5606	0.8962	0.9922	0.9217
130	1.495	1.464	1.575	1.296	0.9780	1.195	1.542	1.319
140	1.854	1.843	1.825	1.654	1.578	1.683	1.792	1.810
150	2.110	2.194	1.961	1.992	1.902	1.952	2.020	2.157
160	2.335	2.285	2.144	2.155	2.376	2.192	2.045	2.294
170	2.201	2.061	2.082	2.152	2.303	2.104	1.915	1.920
180	2.336	2.174	2.093	2.376	2.328	2.203	2.112	2.166
DEG	LUMINOUS INTENSITY:cd							

	Zonal (lm)		Total (lm)	Percent
0-10	254.21	0 - 10	254.21	4.07%
10-20	739.76	0 - 20	993.97	15.92%
20-30	1159.60	0 - 30	2153.57	34.49%
30-40	1347.73	0 - 40	3501.30	56.08%
40-50	1282.48	0 - 50	4783.78	76.62%
50-60	930.28	0 - 60	5714.06	91.52%
60-70	415.74	0 - 70	6129.80	98.18%
70-80	98.33	0 - 80	6228.13	99.76%
80-90	6.67	0 - 90	6234.80	99.87%
90-100	1.62	0 - 100	6236.43	99.89%
100-110	0.69	0 - 110	6237.12	99.90%
110-120	0.80	0 - 120	6237.92	99.92%
120-130	1.04	0 - 130	6238.96	99.93%
130-140	1.22	0 - 140	6240.19	99.95%
140-150	1.21	0 - 150	6241.40	99.97%
150-160	0.99	0 - 160	6242.39	99.99%
160-170	0.61	0 - 170	6243.00	100.00%
170-180	0.20	0 - 180	6243.20	100.00%

## 4.2 Goniophotometer Test

### Axial Candela

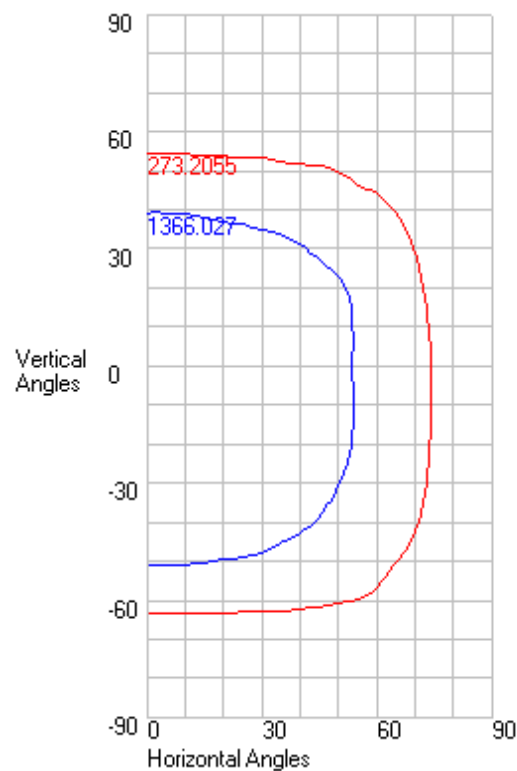
DEG.	HOR.	DEG.	VERT.
90	0.16	90	0.36
85	0.44	85	0.38
75	232.19	75	0.37
65	741.84	65	7.5
55	1292.07	55	223.65
47.5	1640.575	47.5	716.82
42.5	1836.46	42.5	1213.8
37.5	2012.255	37.5	1446.69
33	2150.49	33	1765.09
29	2261.81	29	2233.49
25.5	2355.58	25.5	2529.97
22.5	2412.495	22.5	2600.575
19.5	2468.29	19.5	2614.48
17	2513.57	17	2591.65
15	2547.34	15	2586.18
13	2578.9	13	2601.43
11	2604.5	11	2621.93
9	2625.51	9	2638.55
7	2640.13	7	2644.31
5	2653.14	5	2651.64
3	2659.54	3	2661.97
1	2672.13	1	2670.68
0	2673.236	0	2673.236
-1	2674.5	-1	2679.58
-3	2678.76	-3	2688.76
-5	2674.3	-5	2688.46
-7	2667.74	-7	2674.84
-9	2652.59	-9	2669.63
-11	2634.52	-11	2685.4
-13	2615.94	-13	2704.42
-15	2594.19	-15	2713.94
-17	2569.57	-17	2729.18
-19.5	2534.525	-19.5	2732.055
-22.5	2486.82	-22.5	2710.38
-25.5	2433.185	-25.5	2671.3
-29	2356.69	-29	2590.88
-33	2249.91	-33	2417.27
-37.5	2120.07	-37.5	2172.065
-42.5	1946.195	-42.5	1927.355
-47.5	1730.035	-47.5	1660.725
-55	1372.43	-55	1032.52
-65	819.63	-65	103.36
-75	294.17	-75	26.75
-85	5.91	-85	7.43
-90	0.4	-90	0.221

## 4.2 Goniophotometer Test

### Characteristics

NEMA Type	7 H x 6 V
Maximum Candela	2732.055
Maximum Candela Angle	0 H -19.5 V
Horizontal Beam Angle (50%)	108.9
Vertical Beam Angle (50%)	90.3
Horizontal Field Angle (10%)	148.8
Vertical Field Angle (10%)	117.4
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Beam Lumens	4873
Beam Efficiency	N.A.
Field Lumens	6147
Field Efficiency	N.A.
Spill Lumens	97
Luminaire Lumens	6243
Total Efficiency	N.A.
Total Luminaire Watts	45.9786
Ballast Factor	1

### ISOCANDELA CURVES



## Axial Candela

	0	1	3	5	7	9	11	13	15	17	19.5	22.5	25.5	29	33	37.5	42.5	47.5	55	65	75	85	90
90	0.36	0.353	0.338	0.324	0.309	0.294	0.279	0.265	0.25	0.242	0.232	0.22	0.208	0.194	0.192	0.195	0.198	0.202	0.207	0.2	0.18	0.167	0.16
85	0.38	0.373	0.36	0.347	0.333	0.32	0.306	0.293	0.28	0.272	0.262	0.25	0.238	0.224	0.218	0.215	0.212	0.208	0.203	0.19	0.17	0.159	0.16
75	0.37	0.364	0.353	0.342	0.331	0.32	0.309	0.298	0.288	0.28	0.27	0.256	0.244	0.231	0.224	0.213	0.203	0.196	0.185	0.18	0.166	0.15	0.16
65	7.5	7.706	8.118	8.133	8.071	7.762	7.162	6.228	5.702	6.023	6.662	7.175	5.497	4.246	5.765	5.616	2.654	5.02	1.476	3.108	0.576	0.153	0.16
55	223.65	226.574	232.419	230.342	228.491	224.003	216.857	212.482	213.723	211.559	203.605	188.44	173.228	172.33	150.761	131.142	103.55	108.329	45.517	38.512	6.378	0.18	0.16
47.5	716.82 *	728.139 *	742.793 *	743.637 *	726.973 *	704.315 *	679.468 *	693.3 *	718.581 *	732.456 *	693.312 *	597.006 *	608.542 *	648.741 *	584.815 *	463.779 *	459.416 *	414.629 *	239.684	134.3	19.271	0.218	0.16
42.5	1213.8 *	1214.916 *	1214.916 *	1212.055 *	1206.48 *	1197.745 *	1187.455 *	1179.735 *	1162.207 *	1145.875 *	1123.191 *	1097.075 *	1057.635 *	983.914 *	937.173 *	885.039 *	678.309 *	644.955 *	393.442 *	218.405	35.302	0.248	0.16
37.5	1446.69 *	1450.672 *	1452.154 *	1446.566 *	1440.284 *	1426.054 *	1419.57 *	1408.592 *	1390.897 *	1368.52 *	1320.156 *	1308.893 *	1291.555 *	1240.862 *	1150.931 *	1103.347 *	980.648 *	835.104 *	648.02 *	303.236 *	56.932	0.28	0.16
33	1765.09 *	1767.771 *	1765.888 *	1758.539 *	1745.131 *	1736.384 *	1719.575 *	1699.075 *	1678.319 *	1652.874 *	1654.561 *	1590.938 *	1529.232 *	1477.341 *	1481.479 *	1322.504 *	1171.565 *	1027.219 *	866.492 *	380.208 *	78.632	0.303	0.16
29	2233.49 *	2248.281 *	2249.074 *	2230.559 *	2192.541 *	2160.054 *	2145.303 *	2140.096 *	2091.933 *	1997.975 *	1981.05 *	2029.548 *	1878.841 *	1739.548 *	1737.084 *	1674.181 *	1352.197 *	1213.252 *	1008.57 *	451.061 *	99.415	0.326	0.16
25.5	2529.97 *	2528.838 *	2523.252 *	2513.669 *	2499.201 *	2482.213 *	2460.026 *	2433.661 *	2407.59 *	2370.927 *	2300.178 *	2257.238 *	2205.913 *	2010.836 *	1933.221 *	1895.086 *	1522.966 *	1354.996 *	1117.935 *	505.953 *	119.754	0.345	0.16
22.5	2600.575 *	2597.579 *	2590.281 *	2582.353 *	2567.027 *	2549.577 *	2531.835 *	2506.937 *	2474.144 *	2441.562 *	2403.784 *	2343.386 *	2270.936 *	2188.084 *	2086.42 *	1938.559 *	1662.69 *	1461.892 *	1214.54 *	548.875 *	136.519	0.361	0.16
19.5	2614.48 *	2610.231 *	2602.73 *	2596.563 *	2581.287 *	2567.413 *	2554.104 *	2523.802 *	2495.088 *	2468.472 *	2429.711 *	2367.107 *	2303.364 *	2232.944 *	2124.486 *	1964.31 *	1763.769 *	1557.916 *	1253.994 *	585.935 *	152.792	0.376	0.16
17	2591.65 *	2587.295 *	2580.655 *	2573.686 *	2564.111 *	2552.748 *	2536.783 *	2513.424 *	2486.039 *	2462.322 *	2425.855 *	2367.502 *	2310.311 *	2241.461 *	2131.148 *	1978.193 *	1802.426 *	1632.184 *	1275.82 *	615.021 *	165.889	0.387	0.16
15	2586.18 *	2583.232 *	2576.288 *	2568.601 *	2559.274 *	2546.499 *	2531.038 *	2507.147 *	2479.287 *	2457.427 *	2421.106 *	2361.733 *	2310.527 *	2241.891 *	2132.601 *	1983.415 *	1815.69 *	1643.801 *	1287.013 *	636.913 *	175.832	0.396	0.16
13	2601.43 *	2599.072 *	2590.905 *	2583.596 *	2573.409 *	2558.954 *	2540.66 *	2514.619 *	2489.222 *	2461.891 *	2419.972 *	2363.627 *	2315.991 *	2241.626 *	2131.988 *	1983.596 *	1826.021 *	1652.425 *	1296.742 *	657.466 *	185.269	0.404	0.16
11	2621.93 *	2618.609 *	2609.057 *	2602.791 *	2593.576 *	2576.436 *	2557.896 *	2533.257 *	2503.651 *	2472.63 *	2428.208 *	2377.134 *	2324.801 *	2241.761 *	2128.769 *	1987.205 *	1830.746 *	1657.69 *	1301.939 *	675.899 *	194.169	0.422	0.16
9	2638.55 *	2634.543 *	2624.683 *	2618.409 *	2607.335 *	2593.087 *	2570.838 *	2547.679 *	2518.396 *	2484.019 *	2441.048 *	2388.569 *	2334.91 *	2242.558 *	2134.601 *	1997.495 *	1836.404 *	1660.54 *	1305.79 *	692.26 *	202.502	0.425	0.16
7	2644.31 *	2639.371 *	2631.433 *	2625.573 *	2615.781 *	2600.932 *	2580.118 *	2557.312 *	2527.165 *	2492.224 *	2449.234 *	2397.122 *	2343.26 *	2250.882 *	2141.649 *	2007.144 *	1840.338 *	1660.435 *	1307.149 *	706.603 *	210.238	0.429	0.16
5	2651.64 *	2647.805 *	2636.801 *	2632.116 *	2621.119 *	2605.798 *	2587.453 *	2562.319 *	2532.286 *	2496.606 *	2454.252 *	2404.926 *	2350.679 *	2258.473 *	2147.787 *	2010.898 *	1842.25 *	1657.631 *	1305.996 *	718.989 *	219.561	0.432	0.16
3	2661.97 *	2655.686 *	2646.849 *	2640.239 *	2628.948 *	2613.752 *	2592.278 *	2567.85 *	2539 *	2505.229 *	2462.178 *	2409.759 *	2354.618 *	2262.516 *	2151.045 *	2013.611 *	1841.851 *	1652.627 *	1305.149 *	731.451 *	224.606	0.435	0.16
1	2670.68 *	2665.406 *	2655.09 *	2650.485 *	2637.525 *	2622.664 *	2601.989 *	2576.831 *	2546.157 *	2512.302 *	2467.083 *	2412.311 *	2355.954 *	2263.403 *	2151.762 *	2013.45 *	1838.93 *	1645.23 *	1296.433 *	738.375 *	229.661	0.44	0.16
0	2673.236 *	2672.13 *	2659.54 *	2653.14 *	2640.13 *	2625.51 *	2604.5 *	2578.9 *	2547.34 *	2513.57 *	2468.29 *	2412.495 *	2355.58 *	2261.81 *	2150.49 *	2012.255 *	1836.46 *	1640.575 *	1292.07 *	741.84 *	232.19	0.44	0.16
-1	2679.58 *	2676.462 *	2664.346 *	2658.608 *	2646.219 *	2631.085 *	2610.749 *	2585.289 *	2553.909 *	2519.767 *	2473.431 *	2416.985 *	2359.354 *	2265.722 *	2154.113 *	2015.851 *	1841.324 *	1646.131 *	1297.828 *	746.17 *	233.081	0.462	0.16
-3	2688.76 *	2686.142 *	2673.724 *	2668.047 *	2654.052 *	2638.224 *	2618.859 *	2593.205 *	2562.12 *	2527.377 *	2481.045 *	2423.542 *	2364.713 *	2269.444 *	2158.119 *	2020.855 *	1849.018 *	1655.257 *	1309.33 *	754.824 *	234.861	0.506	0.16
-5	2688.46 *	2686.21 *	2675.262 *	2669.371 *	2654.87 *	2641.119 *	2619.151 *	2591.882 *	2562.474 *	2530.326 *	2484.944 *	2427.154 *	2367.17 *	2269.925 *	2159.63 *	2023.108 *	1854.146 *	1661.778 *	1313.152 *	757.942 *	236.638	0.549	0.16
-7	2674.84 *	2672.112 *	2665.002 *	2658.044 *	2645.558 *	2632.631 *	2611.834 *	2583.682 *	2555.096 *	2524.799 *	2483.928 *	2428.185 *	2365.598 *	2266.721 *	2158.34 *	2024.447 *	1856.889 *	1665.749 *	1317.409 *	761.099 *	233.927	0.593	0.16
-9	2669.63 *	2665.453 *	2658.49 *	2652.007 *	2641.968 *	2624.343 *	2607.181 *	2581.441 *	2546.612 *	2518.377 *	2481.821 *	2431.32 *	2370.82 *	2264.182 *	2156.181 *	2019.834 *	1857.131 *	1667 *	1319.393 *	762.263 *	232.749	0.636	0.16
-11	2685.4 *	2679.194 *	2671.146 *	2661.793 *	2651.772 *	2633.763 *	2612.977 *	2590.07 *	2557.736 *	2519.562 *	2480.193 *	2433.839 *	2374.821 *	2272.916 *	2156.704 *	2014.597 *	1855.173 *	1665.556 *	1319.186 *	761.361 *	230.817	0.679	0.16
-13	2704.42 *	2698.957 *	2690.562 *	2680.338 *	2668.131 *	2649.195 *	2627.194 *	2602.427 *	2569.85 *	2533.872 *	2489.197 *	2438.025 *	2378.643 *	2280.802 *	2166.098 *	2016.569 *	1853.818 *	1661.68 *	1317.921 *	758.328 *	228.129	0.691	0.16
-15	2713.94 *	2709.197 *	2701.549 *	2691.858 *	2679.169 *	2662.151 *	2639.514 *	2613.65 *	2581.837 *	2546.446 *	2502.593 *	2447.422 *	2381.229 *	2287.313 *	2172.086 *	2022.743 *	1848.498 *	1655.12 *	1312.828 *	753.106 *	224.683	0.721	0.16
-17	2729.18 *	2724.29 *	2715.742 *	2706.104 *	2689.878 *	2674.303 *	2651.787 *	2621.385 *	2589.936 *	2559.441 *	2513.15 *	2455.129 *	2381.655 *	2292.497 *	2175.747 *	2025.588 *	1847.552 *	1646.396 *	1306.708 *	745.646 *	220.479	0.747	0.16
-19.5	2732.055 *	2728.321 *	2720.685 *	2713.207 *	2695.492 *	2677.372 *	2658.583 *	2625.875 *	2593.87 *	2562.407 *	2520.301 *	2454.455 *	2378.863 *	2292.785 *	2176.299 *	2023.288 *	1841.048 *	1634.427 *	1295.152 *	733.303 *	214.159	0.774	0.16
-22.5	2710.38 *	2707.506 *	2700.588 *	2692.306 *	2677.181 *	2658.053 *	2636.637 *	2609.626 *	2577.26 *	2546.044 *	2505.971 *	2443.412 *	2362.833 *	2276.454 *	2166.305 *	2012.324 *	1827.049 *	1610.573 *	1275.61 *	715.145 *	205.074	0.799	0.16
-25.5	2671.3 *	2668.68 *	2661.834 *	2652.95 *	2640.12 *	2619.872 *	2596.335 *	2570.071 *	2540.895 *	2509.556 *	2465.722 *	2404.763 *	2332.286 *	2238.625 *	2122.943 *	1990.517 *	1796.282 *	1573.268 *	1231.96 *	688.221 *	194.319	0.813	0.16
-29	2590.88 *	2590.398 *	2584.551 *	2575.563 *	2563.509 *	2542.643 *	2518.899 *	2493.004 *	2466.153 *	2431.53 *	2381.809 *	2327.992 *	2270.239 *	2173.897 *	2047.508 *	1923.108 *	1748.472 *	1513.984 *	1174.372 *	653.53 *	179.62	0.817	0.16
-33	2417.27 *	2418.429 *	2414.386 *	2405.794 *	2392.353 *	2379.263 *	2355.313 *	2332.963 *	2307.614 *	2278.585 *	2233.833 *	2179.749 *	2124.389 *	2045.832 *	1921.535 *	1800.351 *	1656.861 *	1427.396 *	1092.329 *	608.419 *	160.636	0.802	0.16
-37.5	2172.065 *	2172.489 *	2169.706 *	2162.025 *	2152.272 *	2132.378 *	2118.889 *	2101.813 *	2079.72 *	2053.003 *	2012.988 *	1972.24 *	1920.192 *	1848.8 *	1744.633 *	1637.364 *	1492.703 *	1306.523 *	981.788 *	537.815 *	136.59	0.775	0.16
-42.5	1927.355 *	1926.814 *	1923.017 *	1915.661 *	1904.831 *	1888.833 *	1874.225 *	1862.064 *	1830.008 *	1803.901 *	1774.052 *	1741.419 *	1690.84 *	1620.88 *	1532.833 *	1436.698 *	1310.592 *	1138.264 *	858.26 *	437.088 *	107.436	0.715	0.16
-47.5	1660.725 *	1660.428 *	1657.925 *	1652.863 *	1645.237 *	1632.312 *	1618.33 *	1607.175 *	1580.561 *	1547.046 *	1520.68 *	1491.515 *	1453.597 *	1397.144 *	1323.082 *	1239.281 *	1106.69 *	942.178 *	712.708 *	330.395 *	80.092	0.64	0.16
-55	1032.52 *	1038.405 *	1050.167 *	1043.134 *	1039.414 *	1033.024 *	1025.201 *	1022.712 *	1005.595 *	988.071 *	971.154 *	960.595 *	934.318 *	881.57 *	832.755 *	791.788 *	669.974 *	551.917 *	448.694 *	176.752	40.677	0.488	0.16
-65	103.36	104.719	1																				

## LUMEN TABULATION

	0	1	3	5	7	9	11	13	15	17	20	23	26	29	33	38	43	48	55	65	75	85	90	Total
90																								
85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0.1	0.1	0	0	0	0	0
55	0.4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.9	1	0.9	1	1.1	1.1	1	0.9	0.9	0.7	0.3	0	0	0	0
47.5	1.09 *	2.23 *	2.27 *	2.27 *	2.23 *	2.16 *	2.10 *	2.12 *	2.16 *	2.70 *	3.04 *	2.76 *	3.10 *	3.42 *	3.35 *	3.06 *	2.6	2.7	1.8	0.6	0.1	0	0	0
42.5	1.48 *	2.98 *	3.00 *	2.99 *	2.95 *	2.89 *	2.84 *	2.82 *	2.81 *	3.46 *	3.96 *	3.71 *	4.10 *	4.37 *	4.39 *	4.05 *	3.27 *	3.51 *	2.4	0.7	0.1	0	0	0
37.5	2.03 *	4.07 *	4.06 *	4.05 *	4.01 *	3.95 *	3.91 *	3.85 *	3.78 *	4.58 *	5.30 *	5.10 *	5.61 *	5.88 *	6.00 *	5.71 *	4.57 *	5.01 *	3.54 *	1	0.1	0	0	0
33	2.20 *	4.42 *	4.41 *	4.39 *	4.35 *	4.30 *	4.25 *	4.18 *	4.09 *	5.01 *	5.84 *	5.58 *	6.12 *	6.55 *	6.75 *	6.43 *	5.18 *	5.81 *	4.20 *	1.2	0.1	0	0	0
29	2.44 *	4.90 *	4.89 *	4.85 *	4.79 *	4.73 *	4.67 *	4.60 *	4.47 *	5.42 *	6.38 *	6.13 *	6.59 *	6.97 *	7.28 *	6.90 *	5.46 *	6.14 *	4.48 *	1.3	0.1	0	0	0
25.5	2.54 *	5.10 *	5.08 *	5.04 *	4.98 *	4.90 *	4.84 *	4.77 *	4.65 *	5.60 *	6.52 *	6.28 *	6.76 *	7.01 *	7.29 *	6.93 *	5.43 *	6.06 *	4.43 *	1.30 *	0.1	0	0	0
22.5	2.34 *	4.68 *	4.66 *	4.63 *	4.59 *	4.53 *	4.46 *	4.38 *	4.29 *	5.22 *	6.03 *	5.76 *	6.28 *	6.58 *	6.72 *	6.37 *	5.04 *	5.66 *	4.14 *	1.22 *	0.1	0	0	0
19.5	2.38 *	4.75 *	4.74 *	4.70 *	4.66 *	4.60 *	4.54 *	4.45 *	4.36 *	5.32 *	6.16 *	5.87 *	6.45 *	6.84 *	6.93 *	6.57 *	5.33 *	6.00 *	4.37 *	1.30 *	0.1	0	0	0
17	1.98 *	3.95 *	3.94 *	3.91 *	3.88 *	3.83 *	3.78 *	3.71 *	3.64 *	4.45 *	5.15 *	4.91 *	5.42 *	5.75 *	5.82 *	5.57 *	4.61 *	5.18 *	3.74 *	1.14 *	0.1	0	0	0
15	1.58 *	3.15 *	3.14 *	3.12 *	3.09 *	3.06 *	3.01 *	2.96 *	2.91 *	3.55 *	4.12 *	3.93 *	4.35 *	4.61 *	4.68 *	4.49 *	3.75 *	4.22 *	3.05 *	0.95 *	0.1	0	0	0
13	1.58 *	3.16 *	3.14 *	3.12 *	3.10 *	3.06 *	3.02 *	2.97 *	2.91 *	3.55 *	4.12 *	3.94 *	4.36 *	4.62 *	4.68 *	4.51 *	3.78 *	4.25 *	3.09 *	0.97 *	0.1	0	0	0
11	1.59 *	3.18 *	3.17 *	3.15 *	3.12 *	3.08 *	3.04 *	2.98 *	2.93 *	3.57 *	4.13 *	3.96 *	4.37 *	4.63 *	4.69 *	4.53 *	3.81 *	4.28 *	3.13 *	1.00 *	0.1	0	0	0
9	1.60 *	3.20 *	3.19 *	3.17 *	3.14 *	3.10 *	3.06 *	3.00 *	2.94 *	3.59 *	4.15 *	3.98 *	4.39 *	4.64 *	4.70 *	4.55 *	3.82 *	4.30 *	3.16 *	1.02 *	0.1	0	0	0
7	1.61 *	3.21 *	3.20 *	3.18 *	3.15 *	3.12 *	3.07 *	3.02 *	2.96 *	3.60 *	4.17 *	4.00 *	4.41 *	4.66 *	4.73 *	4.58 *	3.84 *	4.32 *	3.18 *	1.04 *	0.1	0	0	0
5	1.61 *	3.22 *	3.21 *	3.19 *	3.16 *	3.13 *	3.08 *	3.03 *	2.97 *	3.62 *	4.19 *	4.01 *	4.43 *	4.68 *	4.75 *	4.60 *	3.85 *	4.33 *	3.20 *	1.05 *	0.1	0	0	0
3	1.62 *	3.23 *	3.22 *	3.20 *	3.17 *	3.14 *	3.09 *	3.04 *	2.98 *	3.63 *	4.20 *	4.03 *	4.44 *	4.70 *	4.76 *	4.61 *	3.86 *	4.33 *	3.22 *	1.07 *	0.1	0	0	0
1	1.62 *	3.24 *	3.23 *	3.21 *	3.18 *	3.15 *	3.10 *	3.05 *	2.99 *	3.64 *	4.22 *	4.04 *	4.45 *	4.71 *	4.77 *	4.62 *	3.86 *	4.33 *	3.22 *	1.08 *	0.1	0	0	0
0	0.81 *	1.62 *	1.62 *	1.61 *	1.60 *	1.58 *	1.55 *	1.53 *	1.50 *	1.82 *	2.11 *	2.02 *	2.23 *	2.35 *	2.39 *	2.31 *	1.93 *	2.16 *	1.61 *	0.54 *	0.1	0	0	0

-1	0.82 *	1.63 *	1.62 *	1.61 *	1.60 *	1.58 *	1.56 *	1.53 *	1.50 *	1.83 *	2.11 *	2.02 *	2.23 *	2.36 *	2.39 *	2.31 *	1.93 *	2.16 *	1.61 *	0.54 *	0.1	0	0
-3	1.63 *	3.26 *	3.25 *	3.23 *	3.20 *	3.17 *	3.12 *	3.07 *	3.00 *	3.66 *	4.23 *	4.05 *	4.47 *	4.72 *	4.79 *	4.63 *	3.87 *	4.35 *	3.25 *	1.10 *	0.1	0	0
-5	1.64 *	3.27 *	3.26 *	3.24 *	3.21 *	3.17 *	3.12 *	3.07 *	3.01 *	3.66 *	4.24 *	4.05 *	4.47 *	4.72 *	4.80 *	4.65 *	3.89 *	4.38 *	3.27 *	1.10 *	0.1	0	0
-7	1.63 *	3.26 *	3.25 *	3.23 *	3.20 *	3.16 *	3.12 *	3.06 *	3.00 *	3.66 *	4.24 *	4.05 *	4.46 *	4.72 *	4.80 *	4.66 *	3.91 *	4.39 *	3.28 *	1.11 *	0.1	0	0
-9	1.63 *	3.25 *	3.24 *	3.22 *	3.19 *	3.16 *	3.11 *	3.06 *	3.00 *	3.66 *	4.24 *	4.06 *	4.46 *	4.72 *	4.80 *	4.66 *	3.91 *	4.41 *	3.29 *	1.11 *	0.1	0	0
-11	1.63 *	3.25 *	3.24 *	3.22 *	3.20 *	3.16 *	3.12 *	3.06 *	3.00 *	3.66 *	4.25 *	4.07 *	4.47 *	4.72 *	4.79 *	4.65 *	3.92 *	4.41 *	3.29 *	1.10 *	0.1	0	0
-13	1.64 *	3.27 *	3.26 *	3.24 *	3.21 *	3.17 *	3.13 *	3.08 *	3.01 *	3.67 *	4.26 *	4.08 *	4.49 *	4.74 *	4.80 *	4.65 *	3.91 *	4.41 *	3.29 *	1.10 *	0.1	0	0
-15	1.65 *	3.29 *	3.28 *	3.26 *	3.23 *	3.19 *	3.14 *	3.09 *	3.03 *	3.69 *	4.27 *	4.09 *	4.51 *	4.76 *	4.81 *	4.65 *	3.91 *	4.40 *	3.28 *	1.09 *	0.1	0	0
-17	1.66 *	3.31 *	3.30 *	3.27 *	3.24 *	3.21 *	3.16 *	3.10 *	3.04 *	3.71 *	4.29 *	4.10 *	4.52 *	4.77 *	4.82 *	4.65 *	3.90 *	4.39 *	3.26 *	1.08 *	0.1	0	0
-20	2.08 *	4.15 *	4.13 *	4.11 *	4.07 *	4.02 *	3.96 *	3.89 *	3.81 *	4.64 *	5.37 *	5.13 *	5.65 *	5.96 *	6.02 *	5.80 *	4.85 *	5.44 *	4.04 *	1.33 *	0.2	0	0
-23	2.49 *	4.96 *	4.94 *	4.91 *	4.86 *	4.81 *	4.73 *	4.65 *	4.56 *	5.56 *	6.43 *	6.13 *	6.74 *	7.13 *	7.20 *	6.92 *	5.75 *	6.45 *	4.78 *	1.56 *	0.2	0	0
-26	2.46 *	4.91 *	4.89 *	4.86 *	4.81 *	4.75 *	4.68 *	4.60 *	4.50 *	5.49 *	6.35 *	6.06 *	6.66 *	7.03 *	7.12 *	6.84 *	5.65 *	6.30 *	4.66 *	1.51 *	0.2	0	0
-29	2.80 *	5.60 *	5.58 *	5.54 *	5.49 *	5.41 *	5.33 *	5.24 *	5.13 *	6.24 *	7.22 *	6.90 *	7.58 *	7.97 *	8.07 *	7.78 *	6.40 *	7.08 *	5.20 *	1.68 *	0.2	0	0
-33	3.05 *	6.10 *	6.07 *	6.03 *	5.97 *	5.89 *	5.80 *	5.70 *	5.58 *	6.78 *	7.84 *	7.50 *	8.24 *	8.66 *	8.75 *	8.46 *	6.96 *	7.64 *	5.58 *	1.79 *	0.2	0	0
-38	3.15 *	6.29 *	6.26 *	6.22 *	6.15 *	6.07 *	5.99 *	5.88 *	5.77 *	7.01 *	8.11 *	7.75 *	8.53 *	8.98 *	9.07 *	8.76 *	7.23 *	7.91 *	5.73 *	1.82 *	0.2	0	0
-43	3.12 *	6.24 *	6.21 *	6.17 *	6.10 *	6.03 *	5.95 *	5.84 *	5.71 *	6.95 *	8.05 *	7.69 *	8.44 *	8.90 *	8.98 *	8.65 *	7.15 *	7.82 *	5.57 *	1.71 *	0.2	0	0
-48	2.73 *	5.46 *	5.44 *	5.40 *	5.34 *	5.27 *	5.20 *	5.10 *	4.96 *	6.03 *	7.00 *	6.69 *	7.32 *	7.71 *	7.79 *	7.47 *	6.11 *	6.66 *	4.64 *	1.4	0.2	0	0
-55	3.08 *	6.17 *	6.15 *	6.10 *	6.03 *	5.95 *	5.86 *	5.74 *	5.58 *	6.76 *	7.85 *	7.52 *	8.20 *	8.60 *	8.74 *	8.28 *	6.60 *	7.21 *	4.94 *	1.3	0.1	0	0
-65	1.73 *	3.50 *	3.49 *	3.46 *	3.42 *	3.36 *	3.30 *	3.24 *	3.17 *	3.87 *	4.50 *	4.28 *	4.67 *	4.96 *	5.07 *	4.71 *	3.80 *	4.26 *	3	0.8	0.1	0	0
-75	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.7	0.8	0.7	0.7	0.8	0.6	0.3	0	0	0
-85	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0	0	0
-90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	73.4	147	146	145	144	142	140	138	135	164	190	182	200	211	214	206	169	189	137	43.3	5.04	0.01	3121.65

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

Model No.	FFLEDS @ 36W / 5000K	Sample ID.	F1
Temperature (°C)	25.4	Humidity (%RH)	54.0

#### 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
120.04	60	0.381	45.7	0.999	2.70%
276.96	60	0.169	44.6	0.953	7.35%

## 5.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
DLF107	Integrating Sphere System	2020/12/26	2021/12/25
DLF108	Auxiliary Lamp	2020/12/26	2021/12/25
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-derectional	2020/12/26	2021/12/25
DLF116	AC Power Source	2020/12/26	2021/12/25
DLF113	Power Meter	2020/12/26	2021/12/25
DLF112	Temperature Recorder	2020/12/26	2021/12/25
DLF114	Temperature & Humidity Datalogger	2020/12/26	2021/12/25
DLF101	Goniophotometer	2020/12/26	2021/12/25
DLF125	Standard Lamp Standard Lamp Type: 76.58 V, 6.7875 A, Tungsten, Omni-derectional	2020/12/26	2021/12/25
DLF104	AC Power Source	2020/12/26	2021/12/25
DLF507	DC Power Source	2020/12/26	2021/12/25
DLF102	Power Meter	2020/12/26	2021/12/25
DLF111	Temperature & Humidity Datalogger	2020/12/26	2021/12/25
DLF119	Power Meter	2020/12/26	2021/12/25
DLF031	Temperature data logger	2020/12/26	2021/12/25
DLF022	Digital power meter	2020/12/26	2021/12/25
DLF003	Temperature & Humidity Datalogger	2020/12/26	2021/12/25

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