

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

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Test Date

2021/10/28

Issue Date

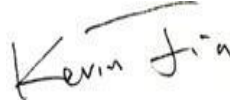
2021/11/1

Prepared By



Wangzun Zhu

Approved By



Kevin Jia

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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		29444
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 105	Premium 120	152.2
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		193.4
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	3.46%
		20.00%	277V	9.73%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.998
		0.9	277V	0.944
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	3985±275	4145
		4 step	3985±154	
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		4
Minimum Rf (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥70		83
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%		-12%
Zonal Lumen Requirement (0°-90°) (Goniophotometer - Section 4.2)	IES LM-79-2008	85%		99.89%
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		1.615
(Goniophotometer - Section 4.2)		Non-Worst Case		0.720
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		193.4
(Goniophotometer - Section 4.2)		Non-Worst Case		188.6

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2021/10/28	FFLEDL @ 180W / 4000K	M1
2	Goniophotometer Test	2021/10/28	FFLEDL @ 180W / 4000K	M1
3	THD and PF Test	2021/10/28	FFLEDL @ 180W / 4000K	M1

Remark(If any)

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- 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: FFLEDL @ 180W / 4000K

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.	FFLEDL @ 180W / 4000K	Sample ID.	M1
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 ± 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
120.01	60	1.619	193.9	0.998
277.00	60	0.721	188.5	0.944

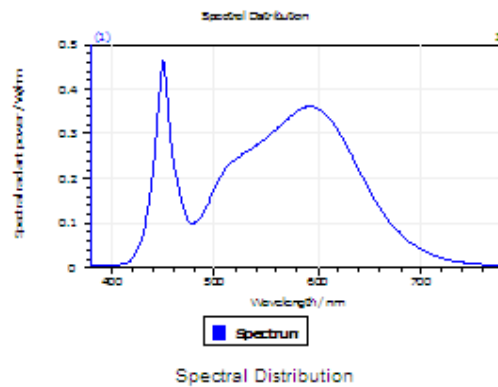
Test Result

CCT (K)	CRI	R9	Duv
4145	82	4	0.0011

Rf	Rg	IES Rcs,h1
83	96	-12%

4.1 Integrating Sphere Test

Results

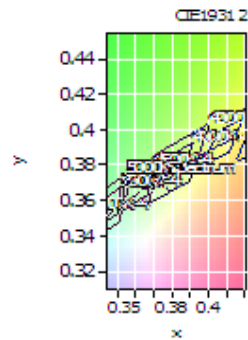


Spectral values

DominantWavelength 579.18 nm
Purity 0.232
PeakWavelength 450.19 nm
Radiant Power 63.63 W
Width50%:

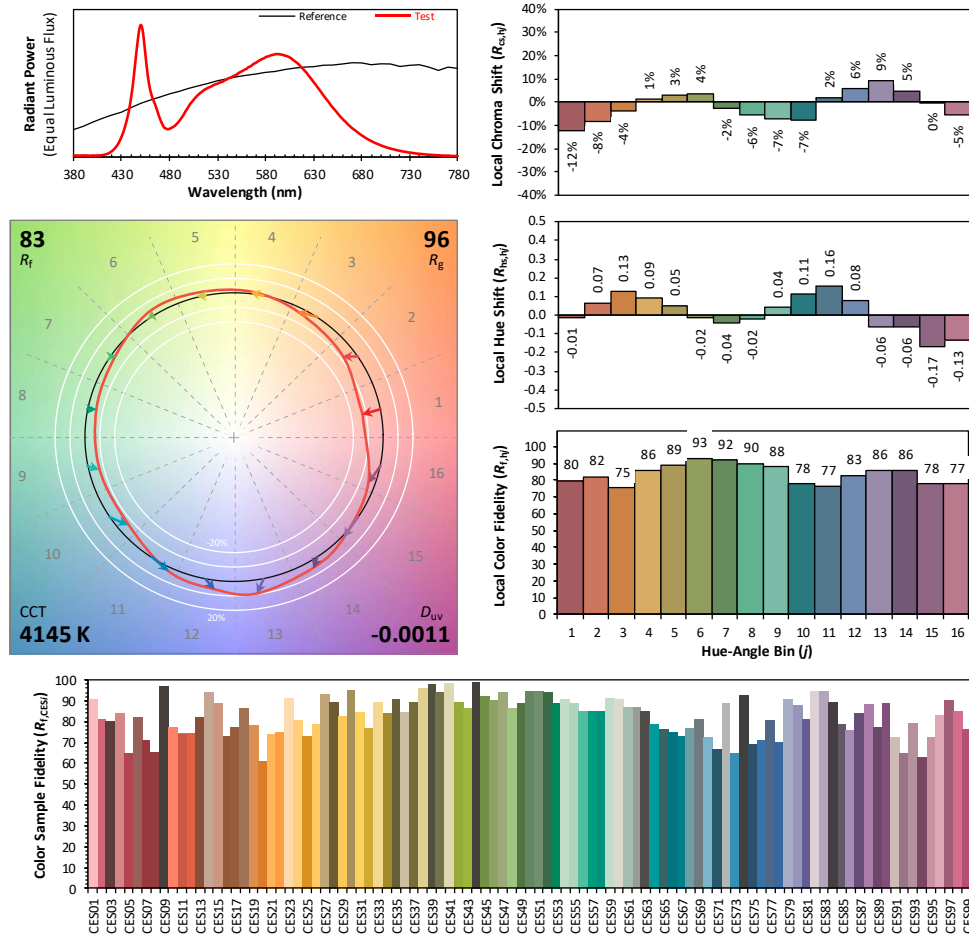
Color Coordinates

Correlated Color Temperat 4145 K
x: 0.3736 u: 0.2232 u': 0.2232
y: 0.3702 v: 0.3317 v': 0.4976
CRI01 80.5 CRI09 4.1
CRI02 88.7 CRI10 73.4
CRI03 94.4 CRI11 80.6
CRI04 81.4 CRI12 62.9
CRI05 81.1 CRI13 82.5
CRI06 84.4 CRI14 97.1
CRI07 84.7 CRI15 74.0
CRI08 62.9 CRI16 72.1
ResultsCRI 82.2



PlanckDistance 1.1E-003

4.1 Integrating Sphere Test



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

x 0.3736
 y 0.3702
 u' 0.2232
 v' 0.4976

CIE 13.3-1995
(CRI)
 R_a 83
 R_9 6

Colors 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.	FFLEDL @ 180W / 4000K	Sample ID.	M1
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	120.06	60	1.615	193.4	0.998
NON-WORST CASE	277.01	60	0.720	188.6	0.945

Test Result

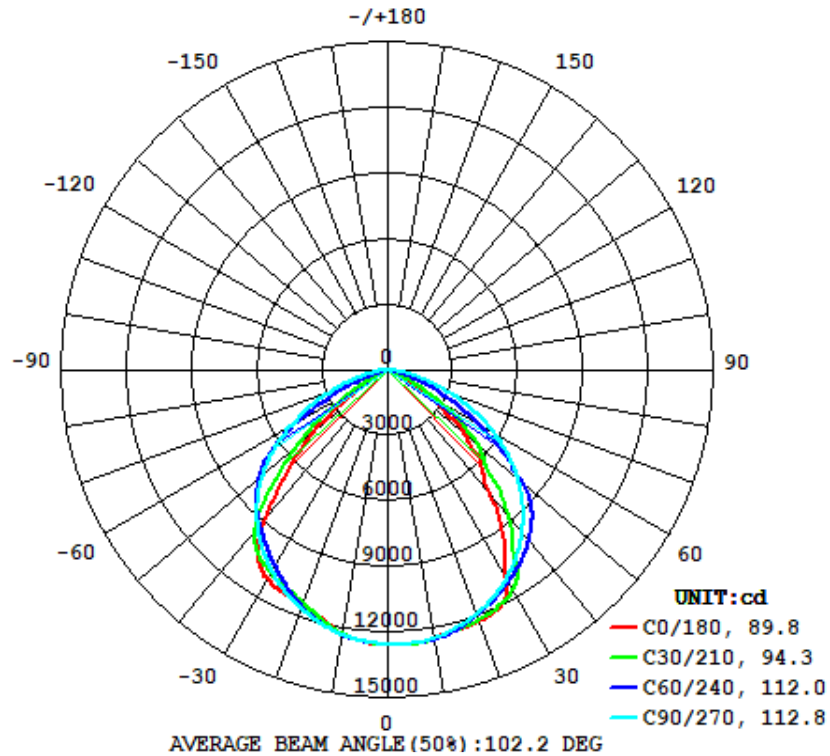
Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
29444	118.8	152.9	89.8	112.8	152.2

Zonal Lumen Requirement
(0° - 90°)

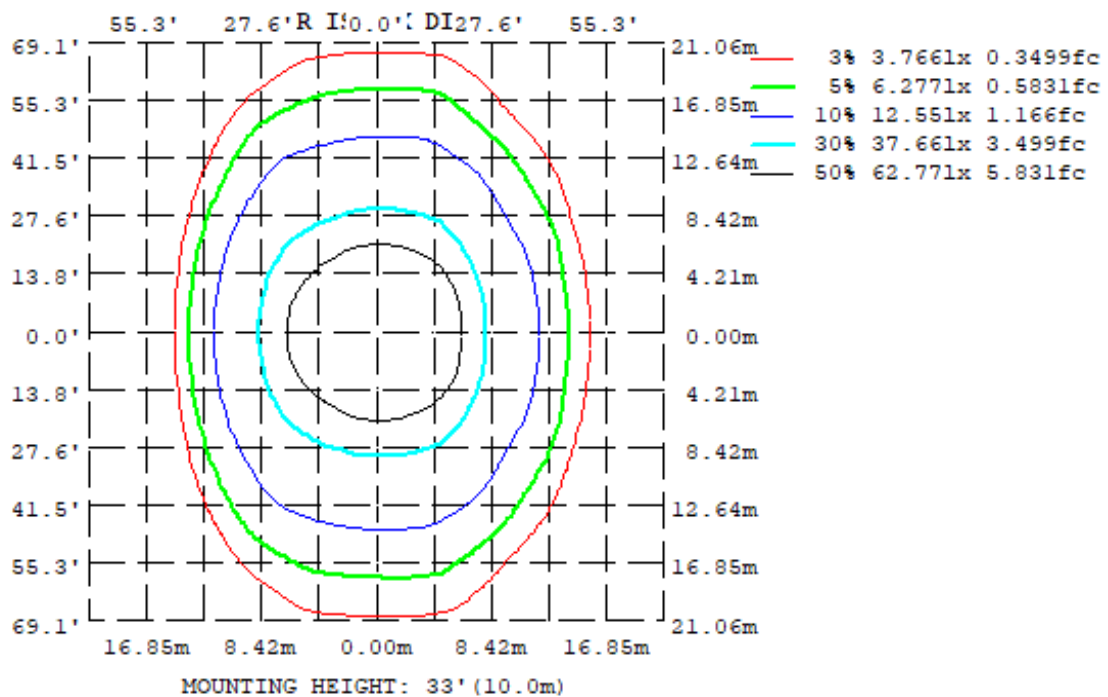
99.89%

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	1242	1253	1244	1236	1224	1227	1229	1241
20	1225	1204	1189	1154	1147	1138	1163	1187
30	1090	1147	1099	1075	1107	1049	1067	1124
40	722.0	974.7	969.2	985.8	873.5	956.2	930.4	920.7
50	474.7	643.6	788.4	725.5	461.6	705.4	753.3	578.2
60	139.6	354.8	559.1	334.9	81.52	312.2	525.0	334.8
70	4.292	55.65	302.1	32.52	15.90	30.35	267.9	33.59
80	0.1078	0.4108	66.86	8.285	2.262	6.638	44.55	0.1163
90	0.0632	0.1421	0.1703	0.4115	0.0315	0.2788	0.0803	0.0590
100	0.0876	0.1867	0.2292	0.3009	0.5733	0.2520	0.2237	0.1230
110	0.1951	0.3040	0.3968	0.3115	0.1758	0.2972	0.3814	0.2384
120	0.3568	0.4253	0.5084	0.4141	0.2841	0.3886	0.4874	0.3450
130	0.5669	0.5497	0.6459	0.5694	0.4787	0.5309	0.6461	0.5045
140	0.7390	0.7105	0.7482	0.7151	0.7363	0.7740	0.8081	0.7420
150	0.8725	0.8688	0.7908	0.8439	0.8699	0.8871	0.9175	0.9065
160	0.9650	0.9176	0.8483	0.8965	1.038	0.9654	0.9413	0.9902
170	0.9803	0.9158	0.8636	0.9084	0.9566	0.9437	0.8756	0.8863
180	1.100	1.013	0.9380	1.034	1.090	1.038	0.9744	1.006
DEG	LUMINOUS INTENSITY: *10cd							

	Zonal (lm)		Total (lm)	Percent
0-10	1192.19	0 - 10	1192.19	4.05%
10-20	3420.82	0 - 20	4613.01	15.67%
20-30	5281.91	0 - 30	9894.92	33.61%
30-40	6374.41	0 - 40	16269.33	55.26%
40-50	6058.88	0 - 50	22328.21	75.83%
50-60	4429.06	0 - 60	26757.27	90.88%
60-70	2073.63	0 - 70	28830.90	97.92%
70-80	546.69	0 - 80	29377.58	99.78%
80-90	34.96	0 - 90	29412.55	99.89%
90-100	3.16	0 - 100	29415.71	99.90%
100-110	2.48	0 - 110	29418.19	99.91%
110-120	3.31	0 - 120	29421.51	99.92%
120-130	4.26	0 - 130	29425.76	99.94%
130-140	5.09	0 - 140	29430.85	99.96%
140-150	5.10	0 - 150	29435.95	99.97%
150-160	4.25	0 - 160	29440.19	99.99%
160-170	2.65	0 - 170	29442.84	100.00%
170-180	0.90	0 - 180	29443.75	100.00%

4.2 Goniophotometer Test

Axial Candela

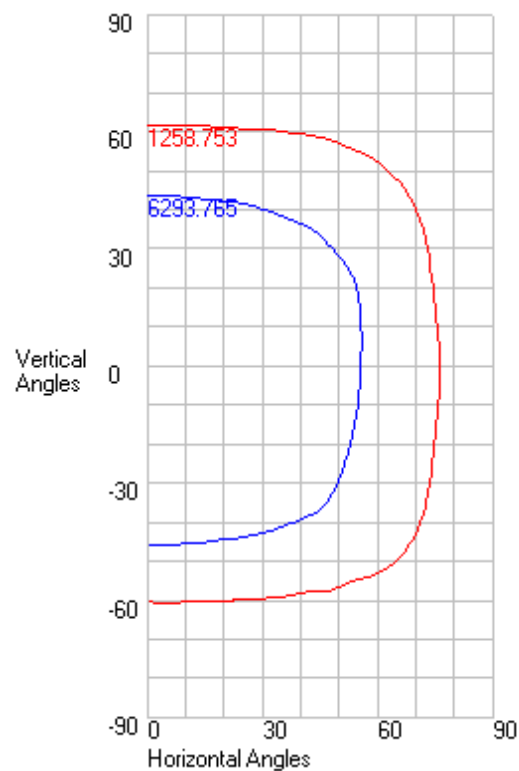
DEG.	HOR.	DEG.	VERT.
90	0.8	90	0.63
85	25.75	85	1.03
75	1434.8	75	3.5
65	3981.12	65	220.17
55	6441.17	55	3086.82
47.5	8024.98	47.5	5299.43
42.5	8904.2	42.5	6596.54
37.5	9684.07	37.5	8518.47
33	10295.85	33	10004.86
29	10779.87	29	11433.48
25.5	11142.82	25.5	11983.35
22.5	11420.07	22.5	12164.67
19.5	11669.19	19.5	12257.01
17	11856.16	17	12299.94
15	11997.04	15	12327.41
13	12126.79	13	12354.05
11	12239.14	11	12388.16
9	12332.2	9	12461.83
7	12408.71	7	12548.7
5	12466.69	5	12575.59
3	12507.69	3	12554.53
1	12536.33	1	12547.59
0	12547.53	0	12547.53
-1	12556.68	-1	12552.24
-3	12562.06	-3	12546.88
-5	12559.38	-5	12506.28
-7	12529.79	-7	12407.27
-9	12473.92	-9	12295.91
-11	12403.14	-11	12170.09
-13	12306.59	-13	11969.05
-15	12196.24	-15	11784.92
-17	12081.39	-17	11638.85
-19.5	11919.71	-19.5	11492.25
-22.5	11696.74	-22.5	11395.32
-25.5	11433.02	-25.5	11294.86
-29	11092.76	-29	11131.75
-33	10640.55	-33	10773.17
-37.5	10056.8	-37.5	9712.27
-42.5	9283.77	-42.5	7566.71
-47.5	8375.66	-47.5	5592.05
-55	6803.2	-55	2447.49
-65	4316.3	-65	254.78
-75	1763.11	-75	89.53
-85	55.76	-85	19.29
-90	1.7	-90	0.33

4.2 Goniophotometer Test

Characteristics

NEMA Type	7 H x 6 V
Maximum Candela	12587.53
Maximum Candela Angle	-3 H 5 V
Horizontal Beam Angle (50%)	113
Vertical Beam Angle (50%)	89.7
Horizontal Field Angle (10%)	153.9
Vertical Field Angle (10%)	122.1
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Beam Lumens	23092
Beam Efficiency	N.A.
Field Lumens	28945
Field Efficiency	N.A.
Spill Lumens	499
Luminaire Lumens	29444
Total Efficiency	N.A.
Total Luminaire Watts	193.442
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	0.63	0.62	0.6	0.58	0.57	0.55	0.53	0.51	0.49	0.49	0.5	0.5	0.51	0.51	0.53	0.55	0.58	0.6	0.64	0.66	0.65	0.75	0.8
85	1.03	1.02	1.01	1	0.99	0.98	0.96	0.95	0.93	0.93	0.93	0.92	0.92	0.91	0.92	0.94	0.95	0.97	1.02	0.95	0.73	0.78	0.8
75	3.5	3.51	3.52	3.53	3.32	3.2	3.05	2.86	2.88	3.37	3.43	3.24	3.01	2.18	4.93	4.89	1.92	6.23	4.61	8.7	1.03	0.9	0.8
65	220.17	227.64	242.57	249.04	255.55	258.98	259.2	256.11	264.26	271.28	268.21	246.75	228.3	230.56	241.93	222.94	170.05	236.87	135.82	142.87	24.91	1.11	0.8
55	3086.82 *	3099.09 *	3123.63 *	3104.84 *	3088.79 *	3060.26 *	3019.83 *	3004.91 *	3004.74 *	2964.78 *	2875.03 *	2757.72 *	2658.35 *	2614.65 *	2486.79 *	2180.96 *	1953.05 *	1680.82 *	1236.92	639.31	121.22	1.3	0.8
47.5	5299.43 *	5323.54 *	5352.6 *	5354.15 *	5325.92 *	5276.23 *	5192.06 *	5137.69 *	5137.45 *	5155.4 *	5078.64 *	4823.64 *	4657.68 *	4594.22 *	4445.37 *	3957.81 *	3609.99 *	3136.32 *	2443.08 *	1270.56 *	298.79	1.71	0.8
42.5	6596.54 *	6600.34 *	6597.04 *	6578.18 *	6542.68 *	6493.6 *	6461.45 *	6442.17 *	6361.85 *	6264.56 *	6137.86 *	6079.58 *	6055.88 *	5706.45 *	5302.83 *	5199.47 *	4723.31 *	3946.21 *	3278.54 *	1770.11 *	442.86	2.03	0.8
37.5	8518.47 *	8532.23 *	8536.95 *	8511.79 *	8475.16 *	8373 *	8329.43 *	8236.08 *	8125.75 *	7990.8 *	7893 *	7671.46 *	7345.4 *	7207.21 *	6852.22 *	6246.47 *	5858.16 *	5122.43 *	4084.88 *	2285.6 *	612.2	2.38	0.8
33	10004.86 *	10017.71 *	10009.13 *	9975.71 *	9915.55 *	9867.2 *	9761.85 *	9654.58 *	9545.72 *	9429.35 *	9335.67 *	9080.6 *	8780.1 *	8477.96 *	8107 *	7651.08 *	6864.98 *	5963.27 *	4712.82 *	2711.51 *	754.23	6.14	0.8
29	11433.48 *	11448.22 *	11416.19 *	11363.24 *	11306.38 *	11169.56 *	11016.69 *	10960.55 *	10894.06 *	10628.7 *	10340.34 *	10277.62 *	10093.83 *	9372.78 *	8993.48 *	8644.76 *	7573.52 *	6616.61 *	5277.65 *	3023.59 *	875.64	9.83	0.8
25.5	11983.35 *	11974.5 *	11948.26 *	11912.31 *	11857.7 *	11773.6 *	11675.27 *	11570.79 *	11447.64 *	11299.99 *	11099.94 *	10858.82 *	10593.38 *	10128.19 *	9567.5 *	9177.76 *	8185.04 *	7094.05 *	5761.45 *	3259.81 *	985.12	12.82	0.8
22.5	12164.67 *	12153.04 *	12124.62 *	12090.36 *	12030.3 *	11952.79 *	11863.75 *	11758.53 *	11629.28 *	11494.16 *	11312.77 *	11068.43 *	10776.18 *	10411.8 *	9944.47 *	9338.26 *	8503.9 *	7417.12 *	6131.15 *	3439.71 *	1069.8	15.19	0.8
19.5	12257.01 *	12244.42 *	12216.27 *	12183.29 *	12120.67 *	12048.58 *	11967.53 *	11853.86 *	11729.41 *	11598.22 *	11420.76 *	11167.21 *	10887.01 *	10533.74 *	10071.7 *	9448.03 *	8642.48 *	7688.62 *	6255.91 *	3614.58 *	1145.33	17.38	0.8
17	12299.94 *	12287.51 *	12258.47 *	12221.47 *	12164.19 *	12097.27 *	12006.99 *	11898.01 *	11775.89 *	11645.81 *	11466.41 *	11219.53 *	10945.01 *	10599.05 *	10130.67 *	9511.53 *	8731.98 *	7874.95 *	6339.02 *	3735.97 *	1201.82	19.04	0.8
15	12327.41 *	12315.07 *	12286.27 *	12247.48 *	12193.98 *	12126.92 *	12034.49 *	11926.3 *	11810.88 *	11675.44 *	11494.92 *	11246.53 *	10984.47 *	10641.13 *	10164.22 *	9550.63 *	8774.51 *	7932.25 *	6391.62 *	3812.71 *	1243.21	20.26	0.8
13	12354.05 *	12343.53 *	12316.6 *	12276.77 *	12226.11 *	12153.69 *	12063.04 *	11956.87 *	11839.48 *	11702.19 *	11517.26 *	11280.61 *	11030.14 *	10676.31 *	10193.71 *	9569.39 *	8827.46 *	7981.61 *	6439.29 *	3872.79 *	1281.11 *	21.38	0.8
11	12388.16 *	12378.11 *	12349.23 *	12316.51 *	12264.59 *	12194.54 *	12097.83 *	12004.23 *	11879.15 *	11731.62 *	11554.39 *	11340.79 *	11074.57 *	10705.65 *	10209.53 *	9597.02 *	8860.05 *	8020.06 *	6467.39 *	3920.36 *	1315.4 *	24.39	0.8
9	12461.83 *	12453.5 *	12421.32 *	12384.21 *	12334.45 *	12259.43 *	12173.31 *	12063.5 *	11926.17 *	11788.54 *	11618.82 *	11393.74 *	11114.5 *	10730.1 *	10245.42 *	9640.14 *	8894.09 *	8046.71 *	6488.8 *	3955.88 *	1345.98 *	24.63	0.8
7	12548.7 *	12539.44 *	12505.43 *	12465.43 *	12416.22 *	12335.27 *	12253.35 *	12126.83 *	11986.27 *	11850.73 *	11677.69 *	11440.72 *	11145.5 *	10761.92 *	10274.26 *	9678.79 *	8916.65 *	8061.51 *	6498.46 *	3979.86 *	1372.72 *	24.88	0.8
5	12575.59 *	12555.14 *	12528.57 *	12494.07 *	12433.94 *	12369.04 *	12275.14 *	12150.18 *	12020.08 *	11893.88 *	11717.79 *	11463.17 *	11165.36 *	10784.26 *	10297.93 *	9690.35 *	8927.86 *	8065.34 *	6496.44 *	3992.85 *	1408.63 *	25.13	0.8
3	12554.53 *	12531.01 *	12508.39 *	12469.45 *	12418.65 *	12344.74 *	12248.55 *	12145.92 *	12026.46 *	11893.05 *	11708.96 *	11456.39 *	11168.3 *	10793.06 *	10307.44 *	9697.44 *	8927.56 *	8058.04 *	6495.43 *	4005.7 *	1419.08 *	25.38	0.8
1	12547.59 *	12526.93 *	12501.39 *	12466.71 *	12412.54 *	12339.03 *	12248.46 *	12139.29 *	12013.3 *	11874.42 *	11686.09 *	11435.93 *	11155.01 *	10789.65 *	10304.74 *	9691.84 *	8915.14 *	8039.03 *	6459.27 *	3989.32 *	1429.56 *	25.75	0.8
0	12547.53 *	12536.33 *	12507.69 *	12466.69 *	12408.71 *	12332.2 *	12239.14 *	12126.79 *	11997.04 *	11856.16 *	11669.19 *	11420.07 *	11142.82 *	10779.87 *	10295.85 *	9684.07 *	8904.2 *	8024.98 *	6441.17 *	3981.12 *	1434.8 *	25.75	0.8
-1	12552.24 *	12539.22 *	12510.63 *	12470.13 *	12413.45 *	12339.12 *	12246.22 *	12134.67 *	12004.83 *	11861.54 *	11670.44 *	11418.69 *	11138.81 *	10774.73 *	10289.85 *	9673.69 *	8891.56 *	8012.53 *	6437.72 *	3986.76 *	1434.25 *	25.76	0.8
-3	12546.88 *	12536.33 *	12508.65 *	12466.79 *	12407.47 *	12331.27 *	12239.56 *	12128.13 *	11999.35 *	11854.55 *	11660.98 *	11404.94 *	11120.25 *	10748.09 *	10262.51 *	9642.79 *	8856.6 *	7978.45 *	6430.84 *	3998.02 *	1433.16 *	25.79	0.8
-5	12506.28 *	12500.5 *	12469.11 *	12435 *	12370.31 *	12298.06 *	12201.25 *	12079.15 *	11957.22 *	11827.92 *	11635.51 *	11378.29 *	11087.04 *	10708.69 *	10222.35 *	9598.53 *	8808.8 *	7932.41 *	6390.57 *	3982.2 *	1432.07 *	25.82	0.8
-7	12407.27 *	12403.92 *	12373.95 *	12334.92 *	12281.65 *	12210.37 *	12117.3 *	11999.65 *	11871.94 *	11741.51 *	11558.64 *	11311.86 *	11034.16 *	10654.89 *	10167 *	9549.18 *	8748.35 *	7874.8 *	6352.72 *	3967.87 *	1404.29 *	25.85	0.8
-9	12295.91 *	12293.22 *	12265.39 *	12228.43 *	12175.79 *	12101.26 *	12008.02 *	11891.33 *	11766.66 *	11635.82 *	11450.56 *	11195.62 *	10922.32 *	10576.87 *	10105.72 *	9468.42 *	8674.74 *	7807.13 *	6305.65 *	3945.41 *	1385.47 *	25.88	0.8
-11	12170.09 *	12169.98 *	12135.74 *	12108.06 *	12046.25 *	11962.27 *	11875.32 *	11751.44 *	11625.45 *	11502.8 *	11319.65 *	11058.52 *	10788.57 *	10452.73 *	9994.99 *	9380.79 *	8587.49 *	7729.7 *	6249.93 *	3915.07 *	1362.02 *	25.91	0.8
-13	11969.05 *	11971.82 *	11941.42 *	11905.33 *	11848.42 *	11779.39 *	11693.48 *	11570.97 *	11456.58 *	11341.44 *	11162.96 *	10900.1 *	10639.45 *	10313.46 *	9875.89 *	9283.75 *	8500.7 *	7641.88 *	6190.65 *	3877.07 *	1333.88 *	23.06	0.8
-15	11784.92 *	11782.79 *	11755.17 *	11719.02 *	11665.36 *	11593.74 *	11513.75 *	11400.54 *	11283.78 *	11172.29 *	11006.3 *	10753.26 *	10480.09 *	10166.58 *	9753.46 *	9186.82 *	8387.71 *	7538.51 *	6111.35 *	3831.67 *	1301 *	22.15	0.8
-17	11638.85 *	11634.06 *	11607.17 *	11568.26 *	11515.64 *	11440.63 *	11357.81 *	11255.75 *	11133.99 *	11005.99 *	10854.1 *	10626.11 *	10348.77 *	10011.82 *	9622.49 *	9088.03 *	8313.53 *	7421.44 *	6029.41 *	3779.33 *	1263.33 *	21.12	0.8
-19.5	11492.25 *	11482.64 *	11455.19 *	11416.16 *	11363.02 *	11290.03 *	11197.06 *	11108.17 *	10997.79 *	10859.45 *	10688.53 *	10493.16 *	10234.59 *	9850.19 *	9461.37 *	8955.5 *	8217.67 *	7344.14 *	5913.57 *	3703.14 *	1209.47	19.66	0.8
-22.5	11395.32 *	11381.73 *	11350.91 *	11315.61 *	11257.42 *	11177.77 *	11089.49 *	10991.3 *	10876.53 *	10741.3 *	10566.51 *	10359.81 *	10099.7 *	9746.98 *	9293.27 *	8790.3 *	8093.36 *	7227.61 *	5755.85 *	3600.07 *	1139.3	17.66	0.8
-25.5	11294.86 *	11281.03 *	11248.81 *	11209.89 *	11158.73 *	11076.87 *	10982.18 *	10877.5 *	10760.91 *	10635.36 *	10463.2 *	10229.9 *	9969.13 *	9619.78 *	9177.3 *	8618.98 *	7932.1 *	7073.07 *	5566.11 *	3459.23 *	1063.35	15.41	0.8
-29	11131.75 *	11118.75 *	11084.41 *	11043.52 *	10995.19 *	10912.68 *	10816.61 *	10709.81 *	10597.25 *	10470.04 *	10289.89 *	10056.21 *	9798.32 *	9467.7 *	8968.83 *	8391.02 *	7741.63 *	6843.38 *	5250.78 *	3283.12 *	963.81	12.47	0.8
-33	10773.17 *	10766.16 *	10734.04 *	10689.75 *	10633.07 *	10568.13 *	10453.66 *	10350.33 *	10244.24 *	10134.71 *	9930.78 *	9658.54 *	9406.02 *	9131.82 *	8571.54 *	7920.25 *	7376.81 *	6479.97 *	4798.3 *	3059.49 *	837.98	8.71	0.8
-37.5	9712.27 *	9719.94 *	9713.64 *	9680.97 *	9641.02 *	9532.88 *	9456.18 *	9362.17 *	9266.26 *	9158.43 *	9007.13 *	8719.43 *	8453.08 *	8215.32 *	7746.5 *	7052.78 *	6502.68 *	5868.97 *	4176.67 *	2659.52 *	685.92	4.78	0.8
-42.5	7566.71 *	7590.54 *	7611.69 *	7595.27 *	7538.84 *	7457.49 *	7392.61 *	7411.46 *	7331.3 *	7250.1 *	7081.36 *	6892.34 *	6747.53 *	6558.08 *	6166.13 *	5671.42 *	5290.53 *	4690.57 *	3401.6 *	2085.92 *	523.97	4.13	0.8
-47.5	5592.05 *	5606.93 *	5618.88 *	5606.31 *	5568.42 *	5506.17 *	5422.83 *	5403.92 *	5367.71 *	5307.9 *	5193.5 *	5021.44 *	4932.64 *	4748.55 *	4480.9 *	4165.77 *	3828.29 *	3333.87 *	2533.1 *	1508.06 *	368.92	3.39	0.8
-55	2447.49 *	2471.98 *	2520.95 *	2506.52 *	2494.91 *	2463.49 *	2412.56 *	2382.69 *	2383.07 *	2371.94 *	2338.95 *	2258.21 *	2125.73 *	2109.29 *	2038.04 *	1849.23 *	1676.19 *	1560.15 *	1179.11 *	784.44 *	195.83	2.32	0.8
-65	254.78	256.57	260.16	260.37	260.41	258.95	255.86	251	253.04	257.53	259.2	251.64	241.85	250.02	269.13	250.8	231.44	314.6	231.34	254.31	50.95	1.99	0.8
-75	89.53	90	90.94	91.89	90.73	90.26</																	

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	0.1	0	0	0.1	0.1	0.1	0	0	0	0
65	0.4	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1	1.2	1.1	1.2	1.5	1.7	1.5	1.4	1.9	1.6	0.7	0.1	0	0	0
55	5.05 *	10.21 *	10.25 *	10.20 *	10.12 *	9.98 *	9.83 *	9.76 *	9.72 *	11.93 *	13.61 *	12.73 *	14.10 *	15.31 *	15.47 *	14	12	13	9.8	3.1	0.3	0	0	0
47.5	9.60 *	19.33 *	19.37 *	19.29 *	19.12 *	18.81 *	18.46 *	18.24 *	18.11 *	22.27 *	25.53 *	23.93 *	26.45 *	28.51 *	28.66 *	27.08 *	22.18 *	24.41 *	17.77 *	5.5	0.6	0	0	0
42.5	9.07 *	18.20 *	18.21 *	18.13 *	17.96 *	17.73 *	17.49 *	17.25 *	16.97 *	20.75 *	24.05 *	23.06 *	25.56 *	26.94 *	27.31 *	26.65 *	21.91 *	24.26 *	18.08 *	5.7	0.7	0	0	0
37.5	11.52 *	23.07 *	23.03 *	22.91 *	22.67 *	22.41 *	22.18 *	21.83 *	21.33 *	25.95 *	30.17 *	28.99 *	32.08 *	33.78 *	34.12 *	33.42 *	27.82 *	30.90 *	23.22 *	7.58 *	0.9	0	0	0
33	12.71 *	25.45 *	25.39 *	25.25 *	25.02 *	24.72 *	24.37 *	23.93 *	23.43 *	28.62 *	33.27 *	31.62 *	34.77 *	37.02 *	37.55 *	36.25 *	30.05 *	33.30 *	25.08 *	8.40 *	1	0	0	0
29	13.07 *	26.15 *	26.05 *	25.89 *	25.63 *	25.27 *	24.88 *	24.52 *	24.02 *	29.15 *	33.85 *	32.53 *	35.60 *	37.40 *	38.38 *	37.12 *	30.26 *	33.46 *	25.38 *	8.58 *	1	0	0	0
25.5	12.49 *	24.95 *	24.86 *	24.70 *	24.45 *	24.10 *	23.75 *	23.41 *	22.93 *	27.77 *	32.17 *	30.98 *	33.95 *	35.49 *	36.37 *	35.29 *	28.73 *	31.94 *	24.33 *	8.22 *	1	0	0	0
22.5	11.03 *	22.03 *	21.96 *	21.83 *	21.63 *	21.38 *	21.07 *	20.72 *	20.31 *	24.74 *	28.66 *	27.42 *	30.19 *	31.86 *	32.49 *	31.49 *	25.85 *	29.07 *	22.22 *	7.49 *	1	0	0	0
19.5	11.16 *	22.28 *	22.21 *	22.08 *	21.88 *	21.63 *	21.33 *	20.96 *	20.56 *	25.07 *	29.05 *	27.78 *	30.64 *	32.52 *	33.10 *	32.05 *	26.63 *	30.20 *	23.11 *	7.87 *	1	0	0	0
17	9.35 *	18.67 *	18.61 *	18.50 *	18.34 *	18.14 *	17.88 *	17.58 *	17.24 *	21.03 *	24.37 *	23.31 *	25.74 *	27.34 *	27.83 *	26.98 *	22.62 *	25.71 *	19.70 *	6.82 *	0.9	0	0	0
15	7.50 *	14.98 *	14.93 *	14.84 *	14.72 *	14.55 *	14.35 *	14.11 *	13.84 *	16.88 *	19.56 *	18.73 *	20.70 *	21.98 *	22.37 *	21.72 *	18.28 *	20.82 *	16.00 *	5.60 *	0.8	0	0	0
13	7.52 *	15.02 *	14.97 *	14.88 *	14.76 *	14.59 *	14.39 *	14.15 *	13.88 *	16.92 *	19.62 *	18.79 *	20.78 *	22.07 *	22.45 *	21.80 *	18.38 *	20.98 *	16.17 *	5.70 *	0.8	0	0	0
11	7.54 *	15.06 *	15.01 *	14.92 *	14.80 *	14.63 *	14.43 *	14.20 *	13.92 *	16.97 *	19.69 *	18.88 *	20.87 *	22.14 *	22.50 *	21.88 *	18.48 *	21.11 *	16.30 *	5.78 *	0.8	0	0	0
9	7.57 *	15.12 *	15.07 *	14.99 *	14.87 *	14.70 *	14.50 *	14.26 *	13.98 *	17.04 *	19.79 *	18.97 *	20.95 *	22.20 *	22.58 *	21.97 *	18.57 *	21.20 *	16.39 *	5.85 *	0.8	0	0	0
7	7.62 *	15.22 *	15.17 *	15.09 *	14.96 *	14.79 *	14.58 *	14.33 *	14.04 *	17.13 *	19.88 *	19.05 *	21.02 *	22.27 *	22.67 *	22.06 *	18.63 *	21.27 *	16.45 *	5.90 *	0.8	0	0	0
5	7.65 *	15.28 *	15.23 *	15.15 *	15.02 *	14.85 *	14.64 *	14.38 *	14.10 *	17.20 *	19.96 *	19.10 *	21.07 *	22.33 *	22.74 *	22.12 *	18.67 *	21.29 *	16.48 *	5.95 *	0.8	0	0	0
3	7.65 *	15.29 *	15.24 *	15.15 *	15.02 *	14.85 *	14.64 *	14.39 *	14.12 *	17.23 *	19.98 *	19.12 *	21.09 *	22.36 *	22.77 *	22.14 *	18.67 *	21.30 *	16.49 *	5.98 *	0.9	0	0	0
1	7.64 *	15.27 *	15.22 *	15.14 *	15.01 *	14.84 *	14.63 *	14.39 *	14.12 *	17.22 *	19.96 *	19.10 *	21.09 *	22.37 *	22.78 *	22.14 *	18.66 *	21.26 *	16.46 *	5.99 *	0.9	0	0	0
0	3.82 *	7.63 *	7.61 *	7.57 *	7.50 *	7.42 *	7.31 *	7.19 *	7.05 *	8.60 *	9.97 *	9.54 *	10.54 *	11.18 *	11.38 *	11.06 *	9.32 *	10.60 *	8.20 *	2.99 *	0.4	0	0	0
	3.82 *	7.64 *	7.61 *	7.57 *	7.50 *	7.42 *	7.31 *	7.19 *	7.05 *	8.59 *	9.96 *	9.53 *	10.53 *	11.17 *	11.37 *	11.05 *	9.30 *	10.59 *	8.19 *	2.99 *	0.4	0	0	0

-1	7.64 *	15.27 *	15.22 *	15.13 *	15.00 *	14.83 *	14.62 *	14.37 *	14.09 *	17.17 *	19.90 *	19.04 *	21.02 *	22.30 *	22.70 *	22.04 *	18.55 *	21.14 *	16.40 *	5.99 *	0.9	0	0
-3	7.63 *	15.24 *	15.19 *	15.10 *	14.97 *	14.80 *	14.58 *	14.33 *	14.06 *	17.14 *	19.85 *	18.98 *	20.95 *	22.21 *	22.60 *	21.94 *	18.47 *	21.05 *	16.37 *	5.99 *	0.9	0	0
-5	7.59 *	15.16 *	15.10 *	15.02 *	14.89 *	14.72 *	14.50 *	14.25 *	13.98 *	17.05 *	19.75 *	18.90 *	20.85 *	22.10 *	22.48 *	21.82 *	18.35 *	20.93 *	16.29 *	5.96 *	0.9	0	0
-7	7.52 *	15.03 *	14.98 *	14.89 *	14.77 *	14.60 *	14.39 *	14.14 *	13.87 *	16.91 *	19.59 *	18.75 *	20.70 *	21.96 *	22.33 *	21.65 *	18.21 *	20.78 *	16.20 *	5.92 *	0.8	0	0
-9	7.45 *	14.89 *	14.83 *	14.75 *	14.62 *	14.45 *	14.24 *	13.99 *	13.73 *	16.74 *	19.38 *	18.54 *	20.49 *	21.76 *	22.13 *	21.45 *	18.04 *	20.60 *	16.09 *	5.87 *	0.8	0	0
-11	7.35 *	14.69 *	14.63 *	14.55 *	14.42 *	14.26 *	14.05 *	13.81 *	13.55 *	16.53 *	19.14 *	18.30 *	20.23 *	21.51 *	21.91 *	21.23 *	17.85 *	20.40 *	15.96 *	5.81 *	0.8	0	0
-13	7.24 *	14.45 *	14.40 *	14.32 *	14.20 *	14.04 *	13.84 *	13.60 *	13.35 *	16.30 *	18.88 *	18.05 *	19.96 *	21.25 *	21.67 *	21.02 *	17.65 *	20.16 *	15.79 *	5.74 *	0.8	0	0
-15	7.14 *	14.25 *	14.20 *	14.12 *	14.00 *	13.84 *	13.65 *	13.42 *	13.16 *	16.07 *	18.63 *	17.82 *	19.69 *	20.97 *	21.44 *	20.81 *	17.44 *	19.90 *	15.60 *	5.65 *	0.8	0	0
-17	8.81 *	17.59 *	17.53 *	17.42 *	17.27 *	17.07 *	16.84 *	16.56 *	16.24 *	19.81 *	23.00 *	22.03 *	24.29 *	25.84 *	26.45 *	25.73 *	21.57 *	24.53 *	19.18 *	6.91 *	0.9	0	0
-20	10.46 *	20.88 *	20.80 *	20.68 *	20.49 *	20.26 *	19.98 *	19.65 *	19.27 *	23.49 *	27.26 *	26.12 *	28.80 *	30.56 *	31.25 *	30.45 *	25.55 *	28.94 *	22.50 *	8.05 *	1.1	0	0
-23	10.36 *	20.69 *	20.62 *	20.49 *	20.31 *	20.06 *	19.78 *	19.45 *	19.07 *	23.25 *	26.95 *	25.80 *	28.47 *	30.17 *	30.75 *	29.93 *	25.11 *	28.26 *	21.82 *	7.73 *	1	0	0
-26	11.95 *	23.86 *	23.77 *	23.63 *	23.41 *	23.12 *	22.78 *	22.40 *	21.97 *	26.77 *	31.00 *	29.66 *	32.73 *	34.63 *	35.15 *	34.16 *	28.60 *	31.83 *	24.34 *	8.57 *	1.1	0	0
-29	13.34 *	26.64 *	26.53 *	26.36 *	26.12 *	25.79 *	25.39 *	24.96 *	24.49 *	29.82 *	34.46 *	32.92 *	36.37 *	38.38 *	38.65 *	37.52 *	31.41 *	34.39 *	26.01 *	9.11 *	1.1	0	0
-33	14.04 *	28.06 *	27.96 *	27.78 *	27.50 *	27.12 *	26.70 *	26.25 *	25.75 *	31.37 *	36.17 *	34.43 *	38.04 *	40.15 *	40.13 *	38.72 *	32.57 *	35.31 *	26.29 *	9.15 *	1.1	0	0
-38	13.17 *	26.37 *	26.31 *	26.14 *	25.82 *	25.45 *	25.14 *	24.78 *	24.31 *	29.59 *	34.10 *	32.50 *	35.96 *	38.00 *	37.96 *	36.59 *	30.85 *	33.40 *	24.56 *	8.39 *	1	0	0
-43	10.04 *	20.12 *	20.10 *	19.96 *	19.71 *	19.40 *	19.18 *	18.97 *	18.62 *	22.65 *	26.09 *	24.96 *	27.66 *	29.19 *	29.32 *	28.40 *	23.72 *	25.79 *	19.06 *	6.4	0.7	0	0
-48	9.21 *	18.53 *	18.55 *	18.42 *	18.19 *	17.85 *	17.54 *	17.34 *	17.08 *	20.84 *	24.02 *	22.82 *	25.20 *	26.81 *	27.07 *	25.98 *	21.67 *	23.98 *	18.14 *	6.1	0.7	0	0
-55	4.14 *	8.39 *	8.44 *	8.37 *	8.27 *	8.09 *	7.90 *	7.80 *	7.75 *	9.52 *	11.02 *	10	11	13	13	12	11	12	10	3.8	0.4	0	0
-65	0.5	1.1	1.1	1.1	1.1	1	1	1	1	1.3	1.5	1.4	1.6	1.9	2	2	2	2.7	2.6	1.2	0.1	0	0
-75	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.8	0.6	0.2	0	0	0
-85	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0
-90																							
Total	340	679	677	673	667	659	649	639	627	765	886	846	934	991	1006	974	815	916	701	245	31.7	0.1	14722

4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	FFLEDL @ 180W / 4000K	Sample ID.	M1
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
120.01	60	1.619	193.9	0.998	3.46%
277.00	60	0.721	188.5	0.944	9.73%

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*****