

Photometric Test Report

Relevant Standards

- ☒ IES LM-79-2008
- ☒ ANSI C82.77:2017

Prepared For

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Report Number

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Test Date

2021/10/28

Issue Date

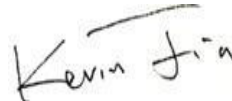
2021/11/1

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		38160
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 105	Premium 120	146.5
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		260.5
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	2.19%
		20.00%	277V	5.07%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.999
		0.9	277V	0.964
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	3985±275	4143
		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		97
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		2.173
(Goniophotometer - Section 4.2)		Non-Worst Case		0.941
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		260.5
(Goniophotometer - Section 4.2)		Non-Worst Case		251.2

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2021/10/28	FFLEDL @ 230W / 4000K	O1
2	Goniophotometer Test	2021/10/28	FFLEDL @ 230W / 4000K	O1
3	THD and PF Test	2021/10/28	FFLEDL @ 230W / 4000K	O1

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 @ 230W / 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 @ 230W / 4000K	Sample ID.	O1
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	2.163	259.3	0.999
276.95	60	0.937	250.3	0.964

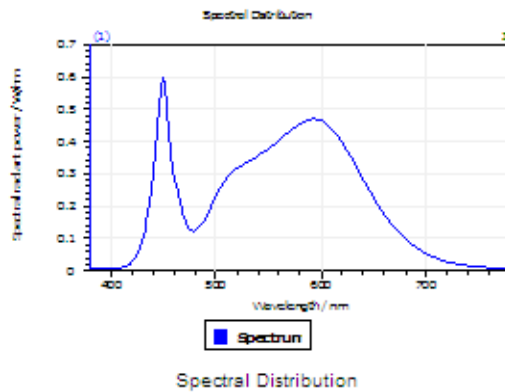
Test Result

CCT (K)	CRI	R9	Duv
4143	82	4	0.00093

Rf	Rg	IES Rcs,h1
83	97	-12%

4.1 Integrating Sphere Test

Results



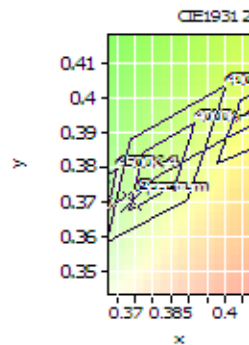
Spectral values

DominantWavelength 579.09 nm
Purity 0.234
PeakWavelength 449.61 nm
Radiant Power 82.45 W
Width50%:

Color Coordinates

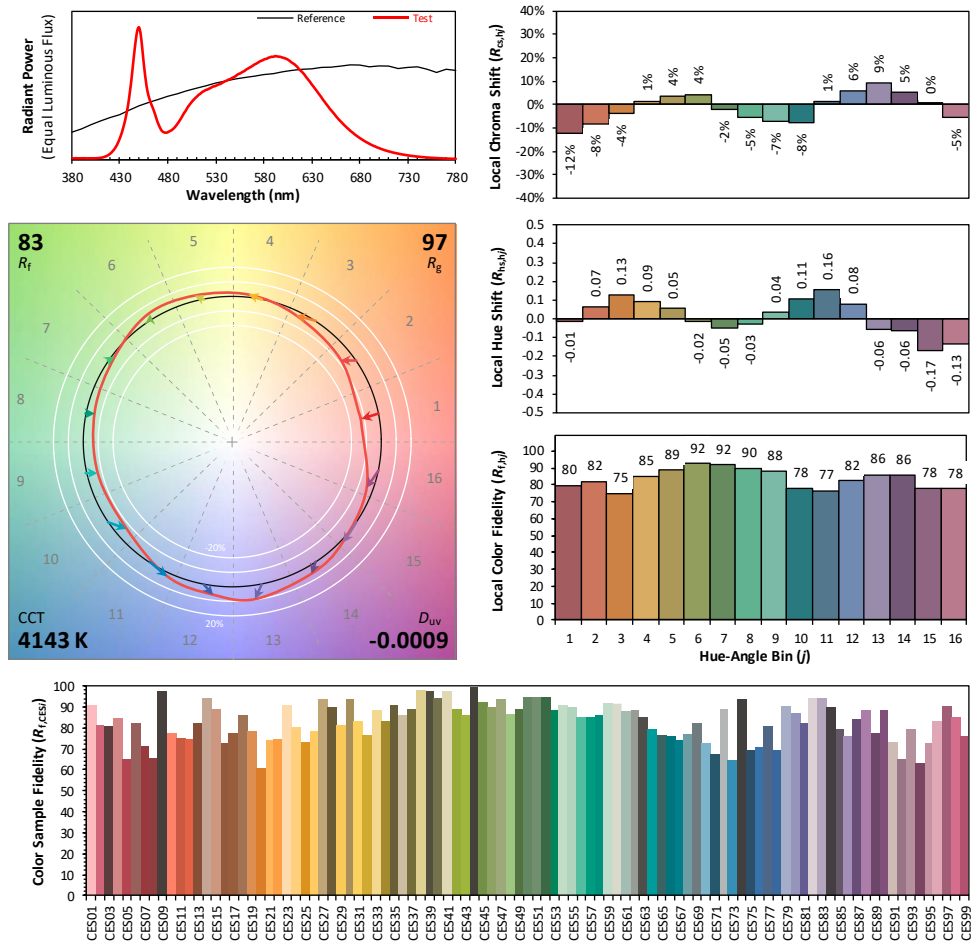
Correlated Color Temperatur 4143 K
x: 0.3738 u: 0.2232 u': 0.2232
y: 0.3706 v: 0.3319 v': 0.4978

CRI01	80.3	CRI09	3.7
CRI02	88.3	CRI10	72.6
CRI03	94.1	CRI11	80.8
CRI04	81.5	CRI12	63.1
CRI05	81.0	CRI13	82.2
CRI06	84.0	CRI14	96.9
CRI07	84.8	CRI15	73.7
CRI08	62.9	CRI16	72.1
ResultsCRI	82.1		



PlanckDistance 9.3E-004

4.1 Integrating Sphere Test



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

x 0.3738
 y 0.3706
 u' 0.2232
 v' 0.4978

CIE 13.3-1995
(CRI)

R_a 82
 R_g 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 @ 230W / 4000K	Sample ID.	O1
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	120.01	60	2.173	260.5	0.999
NON-WORST CASE	277.04	60	0.941	251.2	0.964

Test Result

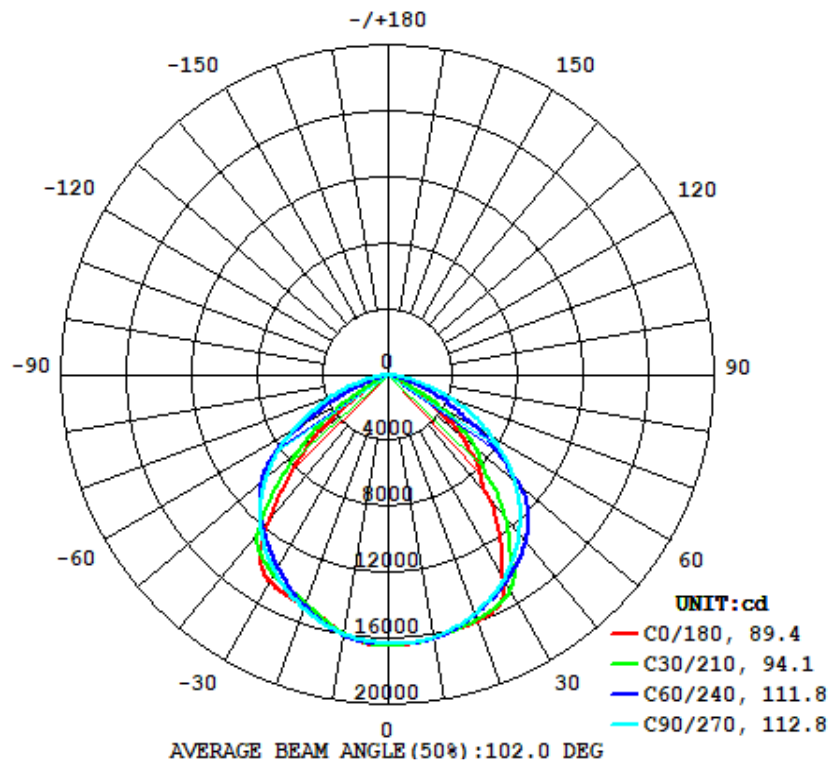
Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
38160	118.3	152.9	89.4	112.8	146.5

Zonal Lumen Requirement
(0° - 90°)

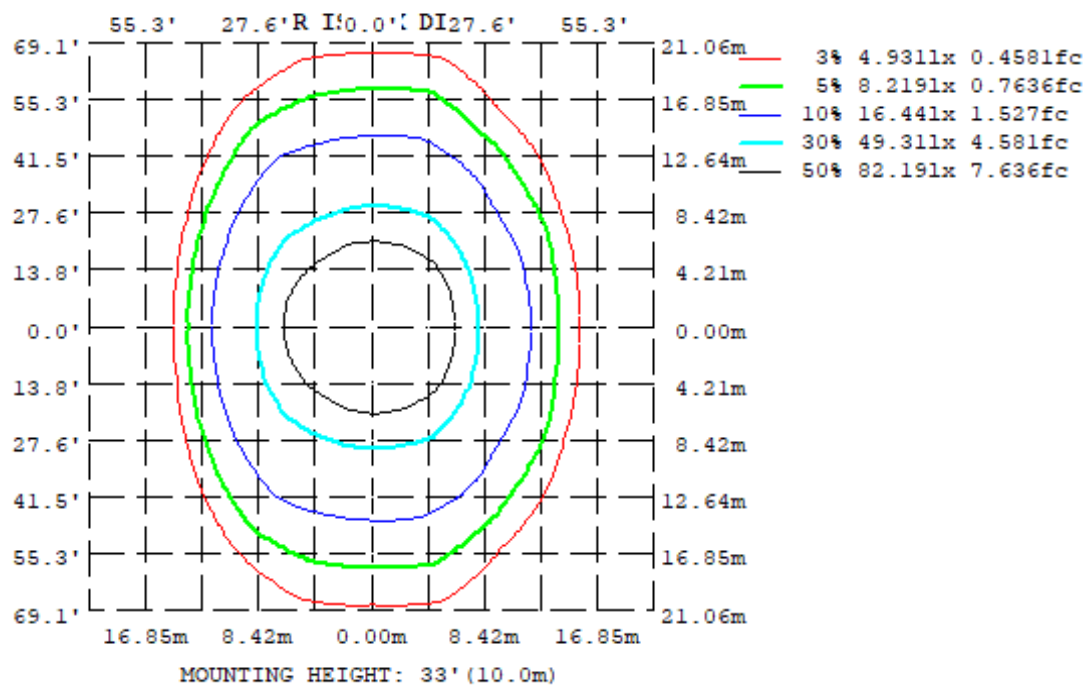
99.89%

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	1615	1624	1616	1599	1595	1596	1596	1603
20	1593	1561	1544	1492	1497	1478	1511	1534
30	1416	1487	1427	1389	1451	1366	1385	1453
40	930.5	1262	1259	1275	1132	1252	1213	1191
50	615.1	829.6	1023	935.3	600.3	915.0	982.3	748.4
60	170.9	458.9	723.0	434.7	102.7	405.6	683.2	432.6
70	5.417	61.56	393.1	44.21	20.36	38.93	347.2	41.87
80	0.1434	0.6322	87.27	10.28	2.891	8.639	57.28	0.1523
90	0.0840	0.1875	0.2265	0.6019	0.1982	0.3620	0.1030	0.0771
100	0.1131	0.2432	0.2967	0.3895	0.7360	0.3286	0.2920	0.1597
110	0.2536	0.3957	0.5146	0.4030	0.2260	0.3862	0.4971	0.3098
120	0.4654	0.5540	0.6606	0.5358	0.3670	0.5052	0.6338	0.4478
130	0.7416	0.7170	0.8396	0.7379	0.6210	0.6909	0.8409	0.6552
140	0.9667	0.9267	0.9726	0.9270	0.9579	1.004	1.051	0.9644
150	1.143	1.135	1.028	1.094	1.134	1.151	1.194	1.178
160	1.264	1.198	1.102	1.163	1.358	1.255	1.224	1.287
170	1.283	1.195	1.122	1.179	1.254	1.228	1.139	1.151
180	1.435	1.321	1.230	1.342	1.428	1.352	1.268	1.307
DEG	LUMINOUS INTENSITY: *10cd							

	Zonal (lm)		Total (lm)	Percent
0-10	1547.78	0 - 10	1547.78	4.06%
10-20	4435.25	0 - 20	5983.03	15.68%
20-30	6848.67	0 - 30	12831.70	33.63%
30-40	8269.01	0 - 40	21100.72	55.30%
40-50	7855.35	0 - 50	28956.07	75.88%
50-60	5732.85	0 - 60	34688.92	90.90%
60-70	2679.02	0 - 70	37367.94	97.92%
70-80	705.37	0 - 80	38073.32	99.77%
80-90	45.94	0 - 90	38119.26	99.89%
90-100	4.09	0 - 100	38123.34	99.90%
100-110	3.24	0 - 110	38126.59	99.91%
110-120	4.32	0 - 120	38130.90	99.92%
120-130	5.54	0 - 130	38136.44	99.94%
130-140	6.61	0 - 140	38143.05	99.96%
140-150	6.63	0 - 150	38149.68	99.97%
150-160	5.52	0 - 160	38155.19	99.99%
160-170	3.44	0 - 170	38158.64	100.00%
170-180	1.18	0 - 180	38159.82	100.00%

4.2 Goniophotometer Test

Axial Candela

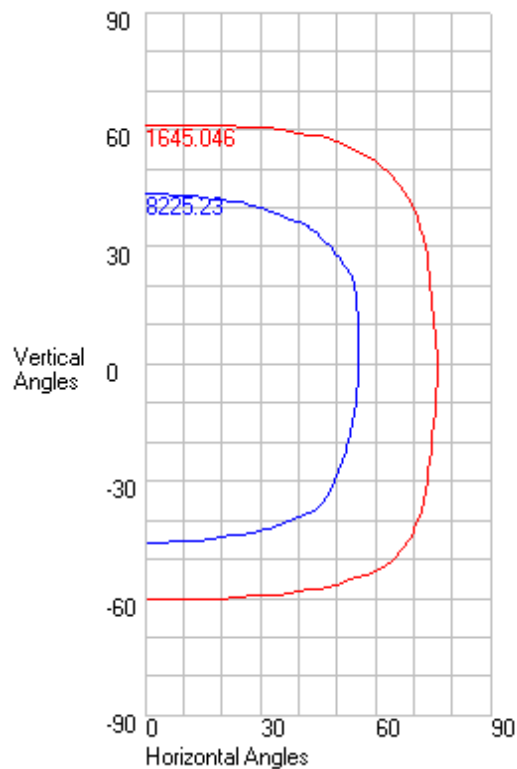
DEG.	HOR.	DEG.	VERT.
90	1.031	90	0.842
85	33.5	85	1.37
75	1839.18	75	4.5
65	5175.96	65	249.6
55	8395.58	55	3946.94
47.5	10461.79	47.5	6864.44
42.5	11607.53	42.5	8519.565
37.5	12627.04	37.5	10980.695
33	13421.4	33	12913.99
29	13995.81	29	14842.33
25.5	14474.7	25.5	15591.2
22.5	14834.33	22.5	15831.79
19.5	15155.805	19.5	15944.265
17	15398.82	17	15988.08
15	15581.73	15	16015.37
13	15751.08	13	16053.26
11	15897.93	11	16111.81
9	16022.79	9	16209.29
7	16120.55	7	16312.87
5	16196.41	5	16383.7
3	16248.45	3	16397.43
1	16284.65	1	16413.48
0	16318.67	0	16318.67
-1	16313.52	-1	16446.57
-3	16318.47	-3	16450.461
-5	16316.26	-5	16353.39
-7	16278.12	-7	16187.55
-9	16206.72	-9	16024.74
-11	16112.76	-11	15854.69
-13	15989.22	-13	15606.67
-15	15848.54	-15	15363.21
-17	15697.79	-17	15174.79
-19.5	15484.78	-19.5	14995.475
-22.5	15192.22	-22.5	14885.245
-25.5	14846.6	-25.5	14766.985
-29	14401.5	-29	14574.79
-33	13818.99	-33	14128.92
-37.5	13056.93	-37.5	12676.12
-42.5	12050.585	-42.5	9831.235
-47.5	10867.89	-47.5	7307.205
-55	8812.06	-55	3129.42
-65	5614	-65	321.43
-75	2292.02	-75	111.5
-85	49.87	-85	24.82
-90	2.273	-90	1.977

4.2 Goniophotometer Test

Characteristics

NEMA Type	7 H x 6 V
Maximum Candela	16450.461
Maximum Candela Angle	0 H -3 V
Horizontal Beam Angle (50%)	112.3
Vertical Beam Angle (50%)	89.1
Horizontal Field Angle (10%)	153.9
Vertical Field Angle (10%)	121.5
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Beam Lumens	29894
Beam Efficiency	N.A.
Field Lumens	37478
Field Efficiency	N.A.
Spill Lumens	681
Luminaire Lumens	38160
Total Efficiency	N.A.
Total Luminaire Watts	260.458
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	0.842	0.829	0.802	0.776	0.749	0.722	0.696	0.669	0.642	0.646	0.651	0.657	0.663	0.67	0.692	0.722	0.755	0.788	0.838	0.867	0.86	0.973	1.03
85	1.37	1.361	1.344	1.327	1.309	1.292	1.274	1.252	1.233	1.23	1.226	1.222	1.217	1.211	1.226	1.251	1.262	1.287	1.35	1.249	0.956	0.997	1.03
75	4.5	4.51	4.531	4.552	4.289	4.131	3.934	3.7	3.777	4.671	5.18	5.259	4.795	3.025	6.428	7.145	2.525	8.518	7.442	10.882	1.347	1.121	1.03
65	249.6	261.115	284.14	295.813	306.473	311.612	310.553	302.644	308.777	323.104	330.154	311.182	280.983	290.537	319.389	275.95	224.441	298.84	172.818	186.571	31.234	1.39	1.03
55	3946.94 *	3964.749 *	4000.347 *	3977.924 *	3960.125 *	3926.844 *	3879.298 *	3864.258 *	3863.435 *	3811.514 *	3695.01 *	3543.594 *	3413.958 *	3360.818 *	3190.787 *	2794.012 *	2506.451 *	2171.213 *	1545.141	810.307	165.454	1.655	1.03
47.5	6864.44 *	6893.945 *	6927.915 *	6925.827 *	6884.65 *	6816.519 *	6707.159 *	6640.364 *	6641.536 *	6665.825 *	6566.73 *	6235.58 *	6021.882 *	5937.57 *	5744.605 *	5116.533 *	4665.408 *	4048.153 *	3158.009 *	1581.116	389.259	2.187	1.03
42.5	8519.565 *	8525.878 *	8524.152 *	8502.081 *	8458.336 *	8398.722 *	8360.268 *	8335.726 *	8231.016 *	8106.086 *	7940.62 *	7866.669 *	7829.152 *	7382.19 *	6859.709 *	6722.298 *	6104.439 *	5101.64 *	4233.378 *	2279.392 *	569.596	2.605	1.03
37.5	10980.695 *	11001.374 *	11013.604 *	10987.389 *	10945.969 *	10818.919 *	10762.278 *	10640.784 *	10498.232 *	10327.595 *	10200.473 *	9908.402 *	9494.555 *	9312.865 *	8852.631 *	8077.484 *	7572.283 *	6618.296 *	5286.053 *	2947.686 *	790.127	3.055	1.03
33	12913.99 *	12931.408 *	12921.751 *	12880.468 *	12805.626 *	12750.522 *	12617.732 *	12475.327 *	12339.544 *	12185.423 *	12064.332 *	11744.506 *	11351.889 *	10957.899 *	10485.673 *	9900.836 *	8869.067 *	7714.356 *	6110.775 *	3502.221 *	973.801	8.077	1.03
29	14842.33 *	14846.04 *	14774.332 *	14674.474 *	14567.264 *	14425.159 *	14282.929 *	14179.532 *	14036.31 *	13688.877 *	13378.141 *	13266.733 *	13070.607 *	12133.341 *	11650.295 *	11202.433 *	9802.477 *	8569.802 *	6848.748 *	3905.476 *	1128.925	12.957	1.03
25.5	15591.2 *	15558.821 *	15482.71 *	15394.799 *	15291.081 *	15185.427 *	15064.381 *	14937.938 *	14784.87 *	14591.851 *	14336.275 *	14033.006 *	13686.839 *	13130.072 *	12411.116 *	11910.337 *	10609.977 *	9190.709 *	7481.882 *	4219.978 *	1264.569	16.9	1.03
22.5	15831.79 *	15792.597 *	15707.926 *	15615.893 *	15519.996 *	15423.933 *	15315.218 *	15183.921 *	15020.949 *	14848.093 *	14618.762 *	14308.017 *	13933.321 *	13482.517 *	12911.834 *	12118.533 *	11034.376 *	9619.585 *	7958.08 *	4462.309 *	1370.25	20.013	1.03
19.5	15944.265 *	15901.263 *	15812.248 *	15718.52 *	15639.344 *	15551.074 *	15450.698 *	15305.725 *	15148.617 *	14981.938 *	14760.323 *	14435.052 *	14076.022 *	13636.265 *	13073.259 *	12268.336 *	11217.556 *	9977.699 *	8131.498 *	4687.225 *	1466.254	22.86	1.03
17	15988.08 *	15943.509 *	15850.89 *	15765.122 *	15695.836 *	15614.7 *	15503.215 *	15364.619 *	15209.252 *	15045.255 *	14816.987 *	14503.521 *	14148.395 *	13716.878 *	13152.575 *	12348.804 *	11335.438 *	10226.979 *	8240.788 *	4844.951 *	1539.178	25.015	1.03
15	16015.37 *	15968.832 *	15872.138 *	15797.583 *	15735.621 *	15654.844 *	15539.233 *	15402.512 *	15256.098 *	15085.914 *	14856.15 *	14540.996 *	14204.789 *	13774.344 *	13194.056 *	12396.529 *	11394.67 *	10308.811 *	8307.833 *	4946.122 *	1592.537	26.588	1.03
13	16053.26 *	16003.823 *	15897.807 *	15838.694 *	15781.894 *	15694.41 *	15581.658 *	15445.812 *	15298.944 *	15125.714 *	14888.976 *	14585.059 *	14265.193 *	13820.193 *	13231.249 *	12425.575 *	11470.461 *	10376.372 *	8370.228 *	5026.167 *	1641.33	28.021	1.03
11	16111.81 *	16054.994 *	15934.653 *	15901.7 *	15843.49 *	15756.55 *	15635.896 *	15513.729 *	15357.607 *	15170.079 *	14940.585 *	14659.714 *	14321.874 *	13856.183 *	13260.469 *	12467.257 *	11515.032 *	10428.198 *	8410.835 *	5089.651 *	1685.433 *	31.939	1.031
9	16209.29 *	16140.903 *	16026.968 *	15991.656 *	15933.439 *	15844.85 *	15732.578 *	15592.471 *	15421.68 *	15248.012 *	15023.238 *	14730.794 *	14375.324 *	13887.234 *	13319.673 *	12529.414 *	11563.434 *	10466.94 *	8442.583 *	5137.253 *	1724.731 *	32.22	1.031
7	16312.87 *	16227.193 *	16129.826 *	16090.797 *	16033.629 *	15938.737 *	15831.275 *	15672.597 *	15500.714 *	15325.837 *	15097.97 *	14789.618 *	14416.924 *	13936.413 *	13362.305 *	12587.883 *	11599.244 *	10491.928 *	8458.805 *	5169.707 *	1759.109 *	32.503	1.031
5	16383.7 *	16229.279 *	16173.737 *	16142.433 *	16074.125 *	15992.289 *	15877.956 *	15719.76 *	15550.595 *	15381.673 *	15153.109 *	14831.413 *	14457.456 *	13976.219 *	13400.164 *	12612.922 *	11621.382 *	10502.312 *	8459.625 *	5187.815 *	1805.019 *	32.787	1.031
3	16397.43 *	16179.796 *	16184 *	16148.009 *	16085.953 *	15993.341 *	15872.314 *	15735.141 *	15577.866 *	15405.436 *	15168.532 *	14845.975 *	14478.861 *	13997.742 *	13421.442 *	12631.347 *	11627.895 *	10497.656 *	8461.719 *	5205.546 *	1818.664 *	33.072	1.031
1	16413.48 *	16221.469 *	16216.318 *	16177.818 *	16110.643 *	16017.152 *	15897.889 *	15753.662 *	15588.85 *	15409.048 *	15164.871 *	14843.016 *	14480.837 *	14003.217 *	13427.886 *	12632.784 *	11618.39 *	10477.641 *	8417.644 *	5185.828 *	1832.338 *	33.5	1.031
0	16318.67 *	16284.65 *	16248.45 *	16196.41 *	16120.55 *	16022.79 *	15897.93 *	15751.08 *	15581.73 *	15398.82 *	15155.805 *	14834.33 *	14474.7 *	13995.81 *	13421.4 *	12627.04 *	11607.53 *	10461.79 *	8395.58 *	5175.96 *	1839.18 *	33.5	1.031
-1	16446.57 *	16360.438 *	16284.798 *	16220.281 *	16144.08 *	16045.561 *	15918.842 *	15771.384 *	15600.999 *	15412.218 *	15160.629 *	14832.686 *	14468.074 *	13988.149 *	13411.529 *	12611.644 *	11590.802 *	10445.679 *	8390.823 *	5183.844 *	1838.267 *	33.522	1.031
-3	16450.461 *	16403.402 *	16328.026 *	16251.033 *	16159.309 *	16054.345 *	15933.859 *	15782.029 *	15610.229 *	15413.973 *	15154.724 *	14814.766 *	14440.243 *	13952.555 *	13371.512 *	12567.836 *	11545.018 *	10401.74 *	8381.321 *	5199.597 *	1836.442 *	33.567	1.031
-5	16353.39 *	16333.684 *	16264.288 *	16199.627 *	16106.221 *	16005.365 *	15868.134 *	15708.513 *	15552.963 *	15381.965 *	15126.656 *	14778.766 *	14392.011 *	13901.002 *	13314.471 *	12506.769 *	11482.877 *	10342.351 *	8328.059 *	5180.868 *	1834.621 *	33.611	1.031
-7	16187.55 *	16176.313 *	16118.55 *	16054.565 *	15966.555 *	15869.649 *	15741.818 *	15584.331 *	15418.022 *	15249.318 *	15016.07 *	14690.4 *	14321.665 *	13831.306 *	13237.236 *	12438.924 *	11404.559 *	10267.773 *	8278.016 *	5163.959 *	1799.718 *	33.655	1.031
-9	16024.74 *	16013.153 *	15960.912 *	15893.474 *	15818.112 *	15708.397 *	15585.343 *	15432.836 *	15258.155 *	15094.649 *	14864.079 *	14538.81 *	14179.247 *	13732.071 *	13152.045 *	12328.648 *	11307.045 *	10177.937 *	8215.921 *	5136.635 *	1776.2 *	33.699	1.031
-11	15854.69 *	15846.644 *	15790.519 *	15740.386 *	15649.732 *	15535.028 *	15409.893 *	15253.102 *	15085.362 *	14916.846 *	14685.037 *	14360.018 *	14008.16 *	13584.689 *	13009.909 *	12210.166 *	11191.591 *	10073.245 *	8142.539 *	5099.158 *	1747.207 *	33.743	1.031
-13	15606.67 *	15604.221 *	15553.123 *	15496.127 *	15413.293 *	15309.221 *	15192.281 *	15032.187 *	14875.464 *	14723.407 *	14494.101 *	14160.742 *	13823.301 *	13418.774 *	12858.892 *	12088.036 *	11077.292 *	9954.49 *	8064.554 *	5051.812 *	1712.743 *	30.069	1.031
-15	15363.21 *	15356.834 *	15313.027 *	15255.512 *	15176.911 *	15075.093 *	14966.863 *	14818.163 *	14664.368 *	14509.457 *	14297.364 *	13966.873 *	13634.098 *	13240.852 *	12704.362 *	11968.58 *	10933.814 *	9819.424 *	7958.879 *	4994.882 *	1672.812 *	28.915	1.031
-17	15174.79 *	15164.363 *	15121.514 *	15062.272 *	14985.829 *	14882.198 *	14772.028 *	14636.221 *	14470.749 *	14301.705 *	14105.58 *	13810.586 *	13484.608 *	13051.247 *	12539.141 *	11844.928 *	10840.28 *	9669.484 *	7849.936 *	4926.96 *	1627.429	27.605	1.031
-19.5	14995.475 *	14978.52 *	14935.093 *	14878.642 *	14802.112 *	14699.954 *	14573.345 *	14451.569 *	14303.626 *	14120.101 *	13896.245 *	13655.353 *	13344.038 *	12847.101 *	12334.431 *	11678.625 *	10718.689 *	9572.3 *	7699.797 *	4826.369 *	1563.08	25.755	1.031
-22.5	14885.245 *	14863.514 *	14816.334 *	14764.884 *	14680.422 *	14568.068 *	14444.329 *	14314.486 *	14159.346 *	13978.269 *	13753.211 *	13502.871 *	13188.255 *	12726.028 *	12127.068 *	11466.968 *	10565.848 *	9423.939 *	7499.698 *	4690.392 *	1476.295	23.234	1.031
-25.5	14766.985 *	14744.766 *	14694.729 *	14636.795 *	14562.55 *	14447.668 *	14318.892 *	14177.54 *	14022.926 *	13859.496 *	13644.238 *	13369.575 *	13029.634 *	12568.02 *	11984.671 *	11255.027 *	10355.953 *	9226.116 *	7242.805 *	4509.444 *	1378.691	20.398	1.031
-29	14574.79 *	14553.403 *	14500.781 *	14439.841 *	14369.014 *	14254.72 *	14124.126 *	13980.363 *	13830.892 *	13673.024 *	13445.805 *	13154.54 *	12822.085 *	12381.342 *	11720.032 *	10963.513 *	10111.214 *	8931.728 *	6831.822 *	4280.654 *	1249.818	16.711	1.031
-33	14128.92 *	14115.141 *	14063.931 *	13997.751 *	13917.163 *	13828.201 *	13661.673 *	13522.245 *	13399.715 *	13281.619 *	13015.501 *	12649.316 *	12306.603 *	11952.096 *	11201.758 *	10332.338 *	9640.75 *	8448.41 *	6241.793 *	3986.65 *	1087.379	12.028	1.031
-37.5	12676.12 *	12689.486 *	12685.036 *	12643.008 *	12591.24 *	12439.507 *	12332.734 *	12213.485 *	12092.343 *	11950.315 *	11743.765 *	11355.769 *	11019.517 *	10722.036 *	10081.196 *	9174.997 *	8491.278 *	7631.585 *	5432.747 *	3464.727 *	890.725	7.152	1.031
-42.5	9831.235 *	9859.844 *	9883.948 *	9861.973 *	9791.866 *	9686.333 *	9600.515 *	9623.665 *	9524.872 *	9418.099 *	9199.817 *	8959.761 *</											

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	0.1	0.1	0.1	0.1	0.1	0	0	0	0
65	0.4	0.9	0.9	0.9	1	1	0.9	0.9	0.9	1.2	1.5	1.4	1.5	1.9	2	1.8	1.8	2.4	2.1	0.9	0.1	0	0	0
55	6.42 *	12.97 *	13.04 *	12.99 *	12.90 *	12.72 *	12.53 *	12.44 *	12.39 *	15.22 *	17.39 *	16.28 *	18.06 *	19.62 *	20	18	15	17	12	4	0.4	0	0	0
47.5	12.38 *	24.92 *	24.97 *	24.85 *	24.62 *	24.24 *	23.83 *	23.57 *	23.39 *	28.73 *	32.97 *	31.00 *	34.23 *	36.76 *	36.96 *	34.92 *	28.61 *	31.48 *	22.76 *	7	0.8	0	0	0
42.5	11.73 *	23.53 *	23.53 *	23.42 *	23.20 *	22.91 *	22.63 *	22.32 *	21.96 *	26.83 *	31.11 *	29.89 *	33.10 *	34.81 *	35.28 *	34.42 *	28.28 *	31.36 *	23.34 *	7.4	0.9	0	0	0
37.5	14.86 *	29.77 *	29.72 *	29.56 *	29.27 *	28.95 *	28.65 *	28.19 *	27.54 *	33.51 *	38.95 *	37.42 *	41.41 *	43.61 *	44.06 *	43.15 *	35.89 *	39.90 *	30.04 *	9.80 *	1.1	0	0	0
33	16.39 *	32.83 *	32.77 *	32.58 *	32.29 *	31.92 *	31.46 *	30.89 *	30.24 *	36.95 *	42.96 *	40.84 *	44.89 *	47.79 *	48.52 *	46.83 *	38.78 *	43.04 *	32.47 *	10.87 *	1.3	0	0	0
29	16.92 *	33.83 *	33.69 *	33.46 *	33.13 *	32.69 *	32.19 *	31.69 *	31.03 *	37.68 *	43.77 *	42.07 *	46.04 *	48.37 *	49.64 *	48.01 *	39.11 *	43.28 *	32.86 *	11.12 *	1.3	0	0	0
25.5	16.22 *	32.39 *	32.22 *	31.98 *	31.65 *	31.21 *	30.76 *	30.30 *	29.66 *	35.93 *	41.63 *	40.10 *	43.96 *	45.96 *	47.11 *	45.70 *	37.17 *	41.33 *	31.51 *	10.65 *	1.3	0	0	0
22.5	14.35 *	28.62 *	28.48 *	28.28 *	28.01 *	27.68 *	27.29 *	26.83 *	26.30 *	32.03 *	37.11 *	35.50 *	39.10 *	41.29 *	42.12 *	40.81 *	33.48 *	37.65 *	28.81 *	9.72 *	1.2	0	0	0
19.5	14.51 *	28.94 *	28.79 *	28.59 *	28.32 *	28.01 *	27.61 *	27.14 *	26.61 *	32.46 *	37.61 *	35.96 *	39.68 *	42.14 *	42.93 *	41.55 *	34.51 *	39.11 *	29.97 *	10.21 *	1.3	0	0	0
17	12.15 *	24.23 *	24.11 *	23.95 *	23.74 *	23.48 *	23.14 *	22.75 *	22.31 *	27.22 *	31.54 *	30.17 *	33.33 *	35.42 *	36.09 *	34.98 *	29.31 *	33.32 *	25.56 *	8.84 *	1.2	0	0	0
15	9.74 *	19.43 *	19.33 *	19.21 *	19.05 *	18.84 *	18.57 *	18.26 *	17.91 *	21.85 *	25.32 *	24.23 *	26.79 *	28.48 *	29.01 *	28.15 *	23.69 *	27.00 *	20.77 *	7.26 *	1	0	0	0
13	9.76 *	19.47 *	19.37 *	19.26 *	19.10 *	18.89 *	18.62 *	18.31 *	17.96 *	21.91 *	25.39 *	24.32 *	26.91 *	28.59 *	29.10 *	28.26 *	23.83 *	27.22 *	21.00 *	7.40 *	1	0	0	0
11	9.79 *	19.52 *	19.43 *	19.32 *	19.16 *	18.95 *	18.68 *	18.38 *	18.02 *	21.97 *	25.48 *	24.43 *	27.02 *	28.68 *	29.18 *	28.37 *	23.98 *	27.39 *	21.17 *	7.50 *	1	0	0	0
9	9.84 *	19.61 *	19.52 *	19.41 *	19.25 *	19.04 *	18.77 *	18.46 *	18.10 *	22.07 *	25.61 *	24.55 *	27.12 *	28.78 *	29.30 *	28.50 *	24.10 *	27.52 *	21.28 *	7.59 *	1	0	0	0
7	9.90 *	19.72 *	19.63 *	19.53 *	19.36 *	19.14 *	18.87 *	18.55 *	18.18 *	22.18 *	25.73 *	24.65 *	27.21 *	28.88 *	29.43 *	28.64 *	24.19 *	27.61 *	21.36 *	7.66 *	1.1	0	0	0
5	9.94 *	19.80 *	19.72 *	19.61 *	19.44 *	19.23 *	18.95 *	18.62 *	18.25 *	22.27 *	25.83 *	24.72 *	27.29 *	28.97 *	29.53 *	28.74 *	24.25 *	27.65 *	21.40 *	7.72 *	1.1	0	0	0
3	9.95 *	19.82 *	19.75 *	19.64 *	19.47 *	19.25 *	18.98 *	18.65 *	18.30 *	22.32 *	25.88 *	24.77 *	27.34 *	29.03 *	29.59 *	28.78 *	24.27 *	27.66 *	21.43 *	7.76 *	1.1	0	0	0
1	9.96 *	19.82 *	19.76 *	19.65 *	19.48 *	19.26 *	18.99 *	18.67 *	18.31 *	22.34 *	25.89 *	24.78 *	27.36 *	29.06 *	29.62 *	28.79 *	24.26 *	27.62 *	21.39 *	7.77 *	1.1	0	0	0
0	4.97 *	9.92 *	9.88 *	9.83 *	9.75 *	9.64 *	9.50 *	9.34 *	9.16 *	11.17 *	12.94 *	12.39 *	13.68 *	14.53 *	14.81 *	14.39 *	12.12 *	13.78 *	10.66 *	3.88 *	0.6	0	0	0
	4.98 *	9.92 *	9.89 *	9.83 *	9.75 *	9.64 *	9.50 *	9.34 *	9.16 *	11.16 *	12.93 *	12.38 *	13.67 *	14.52 *	14.80 *	14.38 *	12.10 *	13.76 *	10.65 *	3.88 *	0.6	0	0	0

-1	9.98 *	19.85 *	19.79 *	19.67 *	19.50 *	19.28 *	19.00 *	18.68 *	18.31 *	22.31 *	25.84 *	24.72 *	27.28 *	28.96 *	29.52 *	28.67 *	24.13 *	27.47 *	21.31 *	7.78 *	1.1	0	0
-3	9.96 *	19.81 *	19.74 *	19.63 *	19.45 *	19.23 *	18.95 *	18.63 *	18.26 *	22.26 *	25.77 *	24.63 *	27.17 *	28.84 *	29.38 *	28.53 *	24.01 *	27.36 *	21.27 *	7.77 *	1.1	0	0
-5	9.89 *	19.69 *	19.60 *	19.49 *	19.32 *	19.10 *	18.82 *	18.50 *	18.15 *	22.13 *	25.63 *	24.51 *	27.03 *	28.68 *	29.21 *	28.36 *	23.86 *	27.20 *	21.18 *	7.74 *	1.1	0	0
-7	9.80 *	19.51 *	19.41 *	19.30 *	19.14 *	18.92 *	18.65 *	18.33 *	17.98 *	21.93 *	25.41 *	24.31 *	26.83 *	28.48 *	29.00 *	28.13 *	23.67 *	27.01 *	21.07 *	7.69 *	1.1	0	0
-9	9.70 *	19.32 *	19.21 *	19.10 *	18.94 *	18.72 *	18.45 *	18.13 *	17.78 *	21.69 *	25.13 *	24.04 *	26.56 *	28.22 *	28.73 *	27.86 *	23.44 *	26.77 *	20.92 *	7.63 *	1.1	0	0
-11	9.58 *	19.07 *	18.96 *	18.85 *	18.69 *	18.47 *	18.21 *	17.89 *	17.55 *	21.42 *	24.81 *	23.73 *	26.24 *	27.91 *	28.43 *	27.57 *	23.19 *	26.50 *	20.75 *	7.55 *	1.1	0	0
-13	9.43 *	18.78 *	18.67 *	18.56 *	18.40 *	18.20 *	17.94 *	17.63 *	17.31 *	21.13 *	24.47 *	23.41 *	25.90 *	27.57 *	28.14 *	27.29 *	22.92 *	26.19 *	20.54 *	7.46 *	1	0	0
-15	9.30 *	18.53 *	18.42 *	18.29 *	18.14 *	17.94 *	17.69 *	17.39 *	17.07 *	20.83 *	24.16 *	23.12 *	25.56 *	27.22 *	27.84 *	27.03 *	22.66 *	25.84 *	20.28 *	7.35 *	1	0	0
-17	11.48 *	22.88 *	22.74 *	22.58 *	22.39 *	22.14 *	21.83 *	21.47 *	21.06 *	25.69 *	29.82 *	28.59 *	31.55 *	33.55 *	34.36 *	33.44 *	28.02 *	31.85 *	24.94 *	9.00 *	1.2	0	0
-20	13.64 *	27.19 *	27.02 *	26.82 *	26.58 *	26.27 *	25.91 *	25.49 *	24.99 *	30.46 *	35.36 *	33.92 *	37.43 *	39.71 *	40.60 *	39.57 *	33.20 *	37.59 *	29.25 *	10.47 *	1.4	0	0
-23	13.54 *	26.98 *	26.81 *	26.61 *	26.34 *	26.03 *	25.66 *	25.23 *	24.74 *	30.17 *	35.00 *	33.53 *	37.00 *	39.22 *	39.97 *	38.91 *	32.63 *	36.70 *	28.36 *	10.07 *	1.3	0	0
-26	15.63 *	31.14 *	30.95 *	30.70 *	30.39 *	30.01 *	29.57 *	29.07 *	28.52 *	34.77 *	40.29 *	38.58 *	42.57 *	45.03 *	45.71 *	44.42 *	37.17 *	41.32 *	31.63 *	11.16 *	1.4	0	0
-29	17.47 *	34.82 *	34.60 *	34.30 *	33.94 *	33.49 *	32.97 *	32.42 *	31.82 *	38.77 *	44.82 *	42.83 *	47.31 *	49.92 *	50.24 *	48.78 *	40.83 *	44.65 *	33.80 *	11.87 *	1.4	0	0
-33	18.37 *	36.65 *	36.45 *	36.14 *	35.72 *	35.21 *	34.66 *	34.08 *	33.46 *	40.77 *	46.99 *	44.73 *	49.44 *	52.18 *	52.09 *	50.29 *	42.30 *	45.81 *	34.16 *	11.91 *	1.4	0	0
-38	17.15 *	34.32 *	34.20 *	33.94 *	33.49 *	32.98 *	32.58 *	32.12 *	31.51 *	38.36 *	44.20 *	42.14 *	46.64 *	49.26 *	49.20 *	47.48 *	40.00 *	43.32 *	31.93 *	10.92 *	1.2	0	0
-43	13.07 *	26.18 *	26.12 *	25.91 *	25.56 *	25.13 *	24.84 *	24.56 *	24.11 *	29.33 *	33.80 *	32.35 *	35.84 *	37.81 *	38.00 *	36.82 *	30.74 *	33.48 *	24.78 *	8.3	0.9	0	0
-48	11.95 *	24.04 *	24.05 *	23.86 *	23.55 *	23.09 *	22.68 *	22.42 *	22.10 *	26.97 *	31.10 *	29.53 *	32.62 *	34.72 *	35.06 *	33.63 *	28.09 *	31.18 *	23.61 *	8	0.9	0	0
-55	5.28 *	10.73 *	10.81 *	10.74 *	10.62 *	10.39 *	10.16 *	10.04 *	9.99 *	12.30 *	14	13	15	16	16	16	14	16	13	4.9	0.6	0	0
-65	0.7	1.3	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.6	1.9	1.8	2.1	2.4	2.6	2.6	2.6	3.5	3.4	1.5	0.2	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	0.8	0.8	1	0.8	0.3	0.1	0	0
-85	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0
-90	441	881	878	872	864	853	841	827	812	990	1147	1096	1210	1284	1304	1263	1057	1188	910	318	40.9	0.11	19080

4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	FFLEDL @ 230W / 4000K	Sample ID.	O1
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	2.163	259.3	0.999	2.19%
276.95	60	0.937	250.3	0.964	5.07%

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*****