

Photometric Test Report

Relevant Standards

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

Prepared For

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2021/11/18

Issue Date

2021/11/22

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		8290
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 105	Premium 120	147.0
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		56.4
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	3.66%
		20.00%	277V	8.45%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.998
		0.9	277V	0.930
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	5029±355	4867
		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		2
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%		-13%
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		0.471
(Goniophotometer - Section 4.2)		Non-Worst Case		0.216
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		56.4
(Goniophotometer - Section 4.2)		Non-Worst Case		55.6

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2021/11/18	FFLEDMD @ 52W / 5000K	B1
2	Goniophotometer Test	2021/11/18	FFLEDMD @ 52W / 5000K	B1
3	THD and PF Test	2021/11/18	FFLEDMD @ 52W / 5000K	B1

Remark(If any)

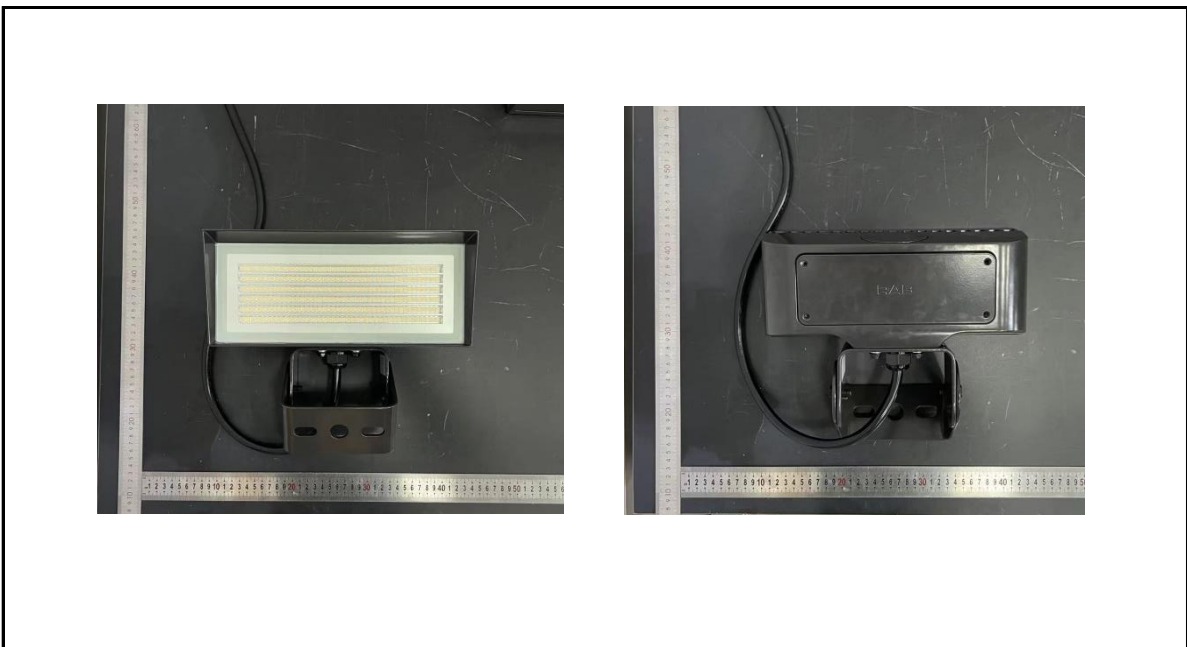
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3.0 Production Description

Luminaire Description: FFLEDMD @ 52W / 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.	FFLED @ 52W / 5000K	Sample ID.	B1
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
119.99	60	0.471	56.4	0.998
276.98	60	0.215	55.3	0.930

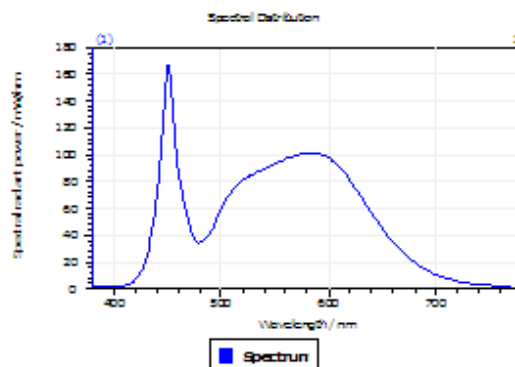
Test Result

CCT (K)	CRI	R9	Duv
4867	82	2	0.0029

Rf	Rg	IES Rcs,h1
83	96	-13%

4.1 Integrating Sphere Test

Results



Spectral values

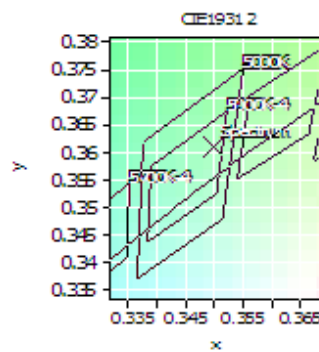
DominantWavelength	571.79 nm
Purity	0.133
PeakWavelength	450.76 nm
Radiant Power	19.32 W
Width50%	18.72 nm

Color Coordinates

Correlated Color Temperat: 4867 K

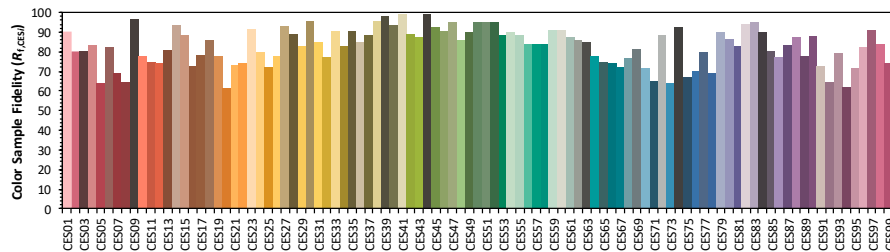
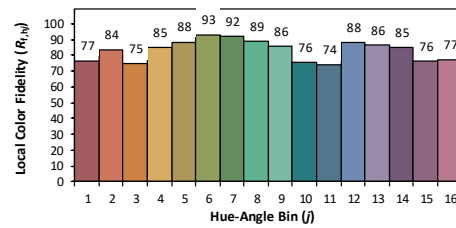
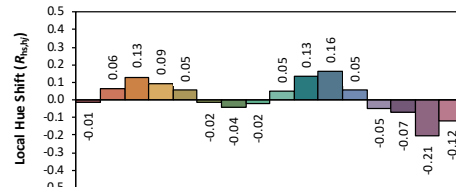
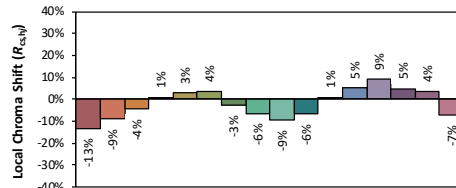
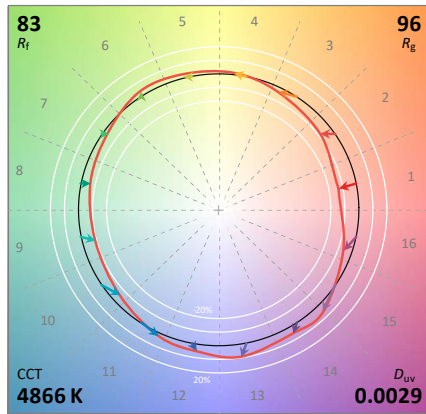
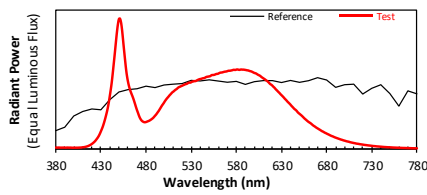
x: 0.3497 u: 0.2108 u': 0.2108
y: 0.3611 v: 0.3266 v': 0.4899

ResultsCRICRI01	79.2	ResultsCRICRI09	1.9
ResultsCRICRI02	86.5	ResultsCRICRI10	67.9
ResultsCRICRI03	91.8	ResultsCRICRI11	80.0
ResultsCRICRI04	81.3	ResultsCRICRI12	54.8
ResultsCRICRI05	79.8	ResultsCRICRI13	80.9
ResultsCRICRI06	81.3	ResultsCRICRI14	95.7
ResultsCRICRI07	87.4	ResultsCRICRI15	72.9
ResultsCRICRI08	65.7	ResultsCRICRI16	70.9
ResultsCRI	81.6		



PlankDistance 2.9E-003

4.1 Integrating Sphere Test



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

x 0.3497
 y 0.3611
 u' 0.2108
 v' 0.4899

CIE 13.3-1995
(CRI)

R_a 81
 R_g 1

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.	FFLED @ 52W / 5000K	Sample ID.	B1
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	0.471	56.4	0.997
NON-WORST CASE	277.02	60	0.216	55.6	0.931

Test Result

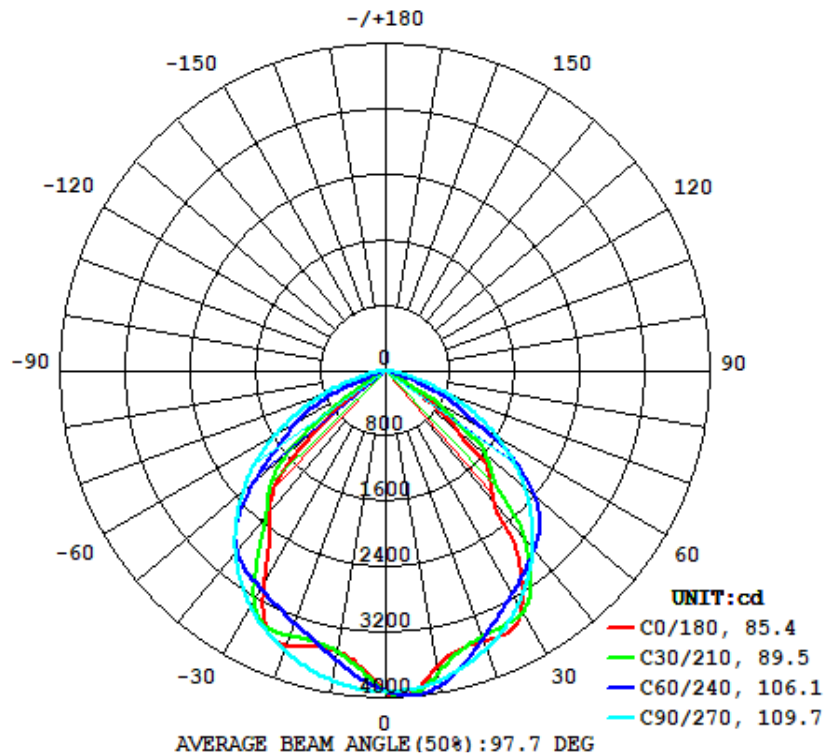
Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
8290	111.3	150.6	85.4	109.7	147.0

Zonal Lumen Requirement
(0° - 90°)

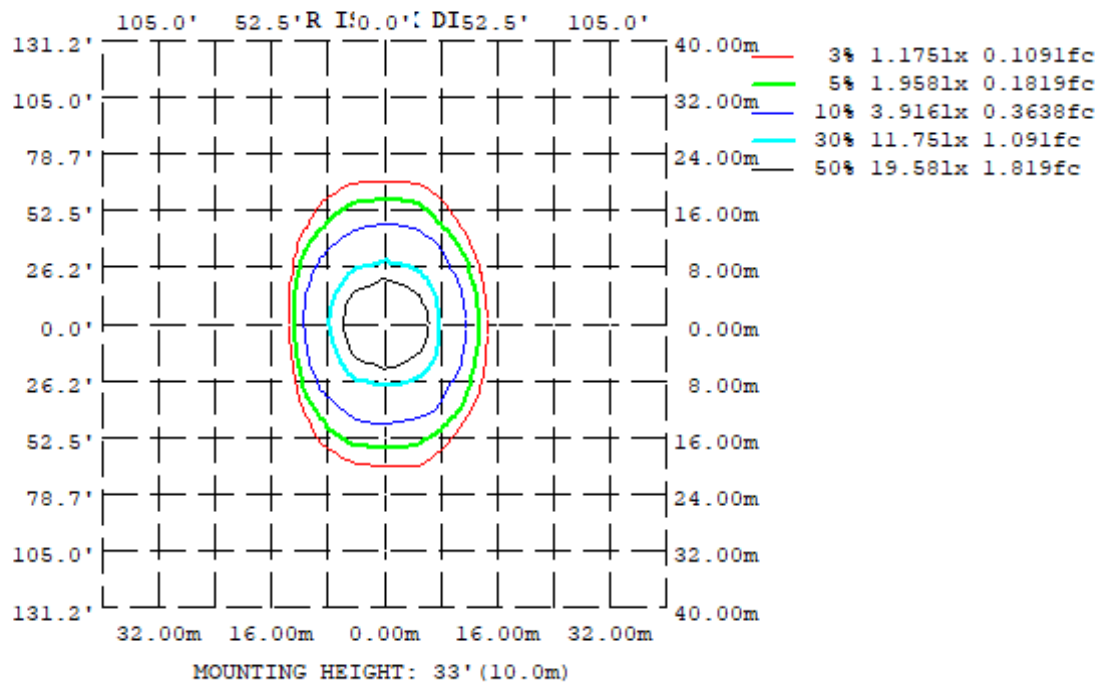
99.89%

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	3673	3828	3839	3526	3485	3512	3841	3784
20	3517	3418	3619	3385	3580	3337	3648	3400
30	3365	3272	3287	3327	2990	3284	3328	3277
40	2085	2945	2834	2518	2233	2589	2878	2864
50	1220	1760	2258	1827	1128	1814	2297	1671
60	128.6	908.7	1564	654.1	68.54	797.0	1586	819.4
70	5.971	48.46	789.5	51.18	35.49	50.18	779.1	22.36
80	0.7004	0.5328	140.7	12.72	9.832	12.89	119.6	0.7443
90	0.3829	0.3331	0.4066	4.405	0.0442	0.2981	0.4906	0.4575
100	0.1257	0.3711	0.5627	0.7460	0.3314	1.131	1.024	0.2734
110	0.3614	0.5989	0.8660	0.6498	0.4501	0.9866	1.465	0.5624
120	0.7067	0.8886	1.128	0.9464	0.8048	1.298	1.483	0.8664
130	1.224	1.245	1.507	1.326	1.364	1.671	2.034	1.392
140	1.704	1.729	1.757	1.734	2.109	2.299	2.246	2.067
150	2.127	2.098	1.869	2.074	2.497	2.582	2.629	2.598
160	2.402	2.193	2.101	2.212	9.519	2.986	2.735	7.993
170	2.448	2.209	2.138	2.260	2.688	2.667	2.482	2.473
180	2.815	2.627	2.570	2.680	2.811	2.714	2.574	2.685
DEG	LUMINOUS INTENSITY:cd							

	Zonal (lm)		Total (lm)	Percent
0-10	361.31	0 - 10	361.31	4.36%
10-20	1007.43	0 - 20	1368.73	16.51%
20-30	1561.01	0 - 30	2929.74	35.34%
30-40	1826.78	0 - 40	4756.52	57.38%
40-50	1710.39	0 - 50	6466.91	78.01%
50-60	1173.05	0 - 60	7639.96	92.16%
60-70	510.30	0 - 70	8150.25	98.31%
70-80	123.66	0 - 80	8273.91	99.81%
80-90	7.22	0 - 90	8281.13	99.89%
90-100	1.08	0 - 100	8282.21	99.91%
100-110	0.66	0 - 110	8282.87	99.91%
110-120	0.83	0 - 120	8283.71	99.92%
120-130	1.10	0 - 130	8284.81	99.94%
130-140	1.33	0 - 140	8286.15	99.95%
140-150	1.34	0 - 150	8287.49	99.97%
150-160	1.43	0 - 160	8288.92	99.99%
160-170	0.83	0 - 170	8289.75	100.00%
170-180	0.24	0 - 180	8289.99	100.00%

4.2 Goniophotometer Test

Axial Candela

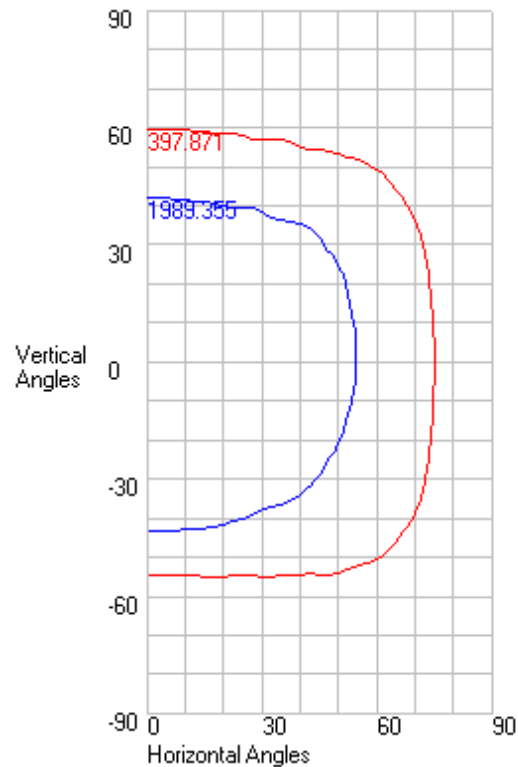
DEG.	HOR.	DEG.	VERT.
90	0.49	90	0.38
85	3.48	85	0.57
75	401.3	75	0.83
65	1194.38	65	23.27
55	1968.46	55	698.04
47.5	2449.49	47.5	1615.66
42.5	2742.005	42.5	1945.27
37.5	3001.74	37.5	2491.295
33	3206.87	33	3111.41
29	3365.48	29	3425.06
25.5	3488.405	25.5	3532.11
22.5	3579.575	22.5	3532.12
19.5	3660.65	19.5	3514.985
17	3716.1	17	3511.32
15	3757.41	15	3526.46
13	3793.78	13	3559.6
11	3826.9	11	3625.01
9	3854.42	9	3725.59
7	3882.48	7	3839.5
5	3902.76	5	3934.17
3	3915.39	3	3978.71
1	3917.75	1	3957.01
0	3901.665	0	3901.665
-1	3914.22	-1	3862.14
-3	3911.49	-3	3742.41
-5	3906.34	-5	3628.99
-7	3886.23	-7	3547.22
-9	3857.23	-9	3497.81
-11	3819.22	-11	3475.11
-13	3780.92	-13	3474.74
-15	3735.8	-15	3495
-17	3689.9	-17	3529.42
-19.5	3632.165	-19.5	3574.41
-22.5	3549.8	-22.5	3570.255
-25.5	3451.33	-25.5	3440.38
-29	3326.15	-29	3107.33
-33	3163.13	-33	2657.07
-37.5	2959.08	-37.5	2351.08
-42.5	2700.01	-42.5	2075.685
-47.5	2411.415	-47.5	1529.305
-55	1930.53	-55	339.77
-65	1182.25	-65	51
-75	422.55	-75	17.89
-85	8.81	-85	5.08
-90	0.41	-90	0.052

4.2 Goniophotometer Test

Characteristics

NEMA Type	7 H x 6 V
Maximum Candela	3978.71
Maximum Candela Angle	0 H 3 V
Horizontal Beam Angle (50%)	108.8
Vertical Beam Angle (50%)	85.4
Horizontal Field Angle (10%)	150.5
Vertical Field Angle (10%)	114.1
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Beam Lumens	6331
Beam Efficiency	N.A.
Field Lumens	8079
Field Efficiency	N.A.
Spill Lumens	211
Luminaire Lumens	8290
Total Efficiency	N.A.
Total Luminaire Watts	56.3887
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	0.38	0.381	0.382	0.384	0.385	0.386	0.388	0.389	0.39	0.394	0.399	0.405	0.411	0.418	0.428	0.44	0.454	0.463	0.473	0.5	0.54	0.507	0.49
85	0.57	0.571	0.574	0.577	0.579	0.582	0.585	0.581	0.582	0.581	0.58	0.578	0.576	0.574	0.576	0.58	0.579	0.568	0.546	0.536	0.553	0.508	0.49
75	0.83	0.832	0.836	0.84	0.837	0.835	0.832	0.826	0.821	0.821	0.818	0.815	0.808	0.786	0.808	0.808	0.768	0.792	0.716	0.846	0.578	0.518	0.49
65	23.27	23.317	23.411	23.176	22.963	22.659	22.267	21.793	21.627	21.355	21.036	20.765	20.217	21.548	19.881	18.442	18.763	21.522	12.065	15.083	3.022	0.544	0.49
55	698.04 *	705.258 *	719.684 *	711.322 *	706.128 *	696.6 *	683.842 *	676.061 *	633.741 *	602.65 *	593.199 *	595.234 *	534.674 *	477.264 *	491.429 *	459.163 *	337.026	334.829	206.714	145.556	19.995	0.576	0.49
47.5	1615.66 *	1619.088 *	1618.17 *	1611.208 *	1603.344 *	1584.209 *	1544.641 *	1498.066 *	1461.99 *	1441.124 *	1421.994 *	1345.704 *	1266.954 *	1255.834 *	1222.007 *	1069.894 *	968.203 *	887.33 *	629.263 *	309.362	51.931	0.671	0.49
42.5	1945.27 *	1942.077 *	1932.963 *	1920.126 *	1903.482 *	1883.698 *	1865.901 *	1855.318 *	1832.517 *	1808.157 *	1772.584 *	1756.525 *	1710.8 *	1645.57 *	1549.177 *	1542.554 *	1312.604 *	1151.888 *	915.847 *	439.663 *	80.402	0.749	0.49
37.5	2491.295 *	2498.672 *	2497.485 *	2479.811 *	2462.09 *	2383.009 *	2334.154 *	2327.53 *	2334.085 *	2308.372 *	2182.454 *	2143.896 *	2184.692 *	2157.466 *	1875.312 *	1873.508 *	1772.378 *	1412.209 *	1207.331 *	618.326 *	131.977	0.833	0.49
33	3111.41 *	3108.043 *	3089.28 *	3061.787 *	3024.878 *	2995.619 *	2961.097 *	2928.885 *	2891.277 *	2846.255 *	2803.402 *	2757.965 *	2684.734 *	2608.615 *	2445.764 *	2213.936 *	2097.739 *	1753.326 *	1402.559 *	794.878 *	181.456	1.245	0.49
29	3425.06 *	3417.625 *	3394.633 *	3366.185 *	3332.199 *	3297.956 *	3263.762 *	3227.902 *	3191.172 *	3150.924 *	3104.409 *	3064.125 *	3013.35 *	2868.146 *	2700.463 *	2558.188 *	2302.4 *	1972.427 *	1564.636 *	897.969 *	222.819	1.652	0.49
25.5	3532.11 *	3519.491 *	3493.557 *	3467.414 *	3438.197 *	3407.189 *	3373.944 *	3342.124 *	3312.561 *	3282.087 *	3244.242 *	3209.512 *	3120.316 *	2980.475 *	2839.778 *	2702.416 *	2402.804 *	2088.985 *	1701.941 *	971.791 *	256.248	1.985	0.49
22.5	3532.12 *	3517.786 *	3489.879 *	3462.925 *	3435.991 *	3408.319 *	3379.838 *	3355.285 *	3339.153 *	3318.244 *	3288.523 *	3232.809 *	3143.372 *	3026.566 *	2901.326 *	2727.562 *	2459.654 *	2162.689 *	1812.26 *	1029.143 *	282.204	2.251	0.49
19.5	3514.985 *	3499.047 *	3468.171 *	3439.244 *	3416.016 *	3391.549 *	3365.589 *	3357.991 *	3344.958 *	3327.319 *	3293.471 *	3225.341 *	3140.136 *	3028.935 *	2911.328 *	2736.9 *	2483.393 *	2212.74 *	1848.693 *	1075.927 *	306.514	2.498	0.49
17	3511.32 *	3494.112 *	3459.76 *	3429.784 *	3409.692 *	3386.37 *	3379.949 *	3371.705 *	3357.664 *	3336.099 *	3293.337 *	3221.978 *	3133.257 *	3043.196 *	2920.407 *	2739.069 *	2491.857 *	2238.609 *	1876.547 *	1109.515 *	325.583	2.687	0.49
15	3526.46 *	3508.097 *	3469.014 *	3441.375 *	3420.816 *	3405.171 *	3407.98 *	3398.928 *	3379.553 *	3353.223 *	3303.541 *	3223.991 *	3150.099 *	3066.339 *	2930.614 *	2738.162 *	2491.313 *	2270.864 *	1896.7 *	1131.791 *	339.376	2.827	0.49
13	3559.6 *	3540.113 *	3494.629 *	3472.289 *	3450.201 *	3457.541 *	3457.267 *	3442.549 *	3418.964 *	3382.741 *	3325.303 *	3253.659 *	3194.864 *	3095.186 *	2942.802 *	2736.765 *	2518.94 *	2301.657 *	1916.366 *	1150.271 *	351.863	2.956	0.49
11	3625.01 *	3603.378 *	3547.753 *	3532.859 *	3525.133 *	3539.567 *	3532.11 *	3509.509 *	3474.787 *	3426.191 *	3374.52 *	3321.022 *	3245.327 *	3128.213 *	2957.516 *	2758.952 *	2557.053 *	2330.781 *	1929.972 *	1165.515 *	363.043	3.296	0.49
9	3725.59 *	3696.944 *	3638.075 *	3613.927 *	3647.603 *	3653.552 *	3627.206 *	3593.444 *	3543.943 *	3506.61 *	3461.125 *	3392.196 *	3300.58 *	3163.257 *	2998.896 *	2810.883 *	2597.096 *	2358.248 *	1942.886 *	1177.577 *	372.917	3.329	0.49
7	3839.5 *	3797.219 *	3737.407 *	3754.867 *	3790.827 *	3762.933 *	3730.001 *	3685.815 *	3643.929 *	3602.901 *	3549.31 *	3465.46 *	3356.752 *	3215.063 *	3050.446 *	2862.376 *	2634.835 *	2383.596 *	1953.498 *	1186.52 *	381.486	3.362	0.49
5	3934.17 *	3866.356 *	3823.719 *	3911.721 *	3882.38 *	3851.341 *	3813.517 *	3772.437 *	3734.198 *	3692.719 *	3622.505 *	3515.817 *	3403.704 *	3265.703 *	3100.877 *	2905.273 *	2669.663 *	2406.326 *	1961.527 *	1192.417 *	392.753	3.396	0.49
3	3978.71 *	3881.753 *	3968.151 *	3956.214 *	3926.769 *	3897.714 *	3869.679 *	3822.08 *	3770.322 *	3714.938 *	3643.543 *	3546.346 *	3442.465 *	3309.9 *	3146.747 *	2946.899 *	2701.355 *	2426.112 *	1970.535 *	1198.476 *	396.167	3.429	0.49
1	3957.01 *	3953.247 *	3950.541 *	3936.882 *	3911.382 *	3878.445 *	3844.46 *	3806.089 *	3764.369 *	3718.158 *	3656.511 *	3570.038 *	3474.5 *	3348.876 *	3188.577 *	2984.507 *	2729.449 *	2442.596 *	1969.152 *	1195.746 *	399.588 *	3.48	0.49
0	3901.665 *	3917.75 *	3915.39 *	3902.76 *	3882.48 *	3854.42 *	3826.9 *	3793.78 *	3757.41 *	3716.1 *	3660.65 *	3579.575 *	3488.405 *	3365.48 *	3206.87 *	3001.74 *	2742.005 *	2449.49 *	1968.46 *	1194.38 *	401.3 *	3.48	0.49
-1	3862.14 *	3864.881 *	3861.808 *	3851.971 *	3830.894 *	3803.6 *	3775.174 *	3742.431 *	3706.254 *	3666.256 *	3611.921 *	3534.04 *	3446.091 *	3328.127 *	3174.921 *	2975.809 *	2723.426 *	2438.17 *	1966.123 *	1195.362 *	400.659 *	3.493	0.49
-3	3742.41 *	3745.451 *	3740.134 *	3731.719 *	3715.421 *	3692.641 *	3662.921 *	3631.826 *	3597.413 *	3560.751 *	3510.639 *	3439.215 *	3358.197 *	3248.385 *	3106.159 *	2921.002 *	2683.349 *	2412.874 *	1961.456 *	1197.324 *	399.379 *	3.518	0.49
-5	3628.99 *	3637.333 *	3628.967 *	3620.707 *	3605.259 *	3579.41 *	3562.197 *	3533.27 *	3499.883 *	3457.692 *	3404.218 *	3340.005 *	3266.377 *	3165.386 *	3034.384 *	2862.766 *	2639.866 *	2384.397 *	1946.419 *	1190.575 *	398.102 *	3.544	0.49
-7	3547.22 *	3551.73 *	3547.132 *	3536.938 *	3516.296 *	3500.471 *	3470.875 *	3442.965 *	3420.977 *	3390.56 *	3339.323 *	3257.208 *	3170.372 *	3079.139 *	2959.732 *	2804.017 *	2593.564 *	2353.174 *	1932.397 *	1184.045 *	389.198	3.569	0.49
-9	3497.81 *	3499.296 *	3494.659 *	3481.72 *	3466.102 *	3439.491 *	3420.069 *	3390.274 *	3348.11 *	3326.038 *	3288.911 *	3221.925 *	3135.849 *	3009.698 *	2885.733 *	2737.615 *	2544.802 *	2319.371 *	1915.842 *	1174.574 *	383.01	3.594	0.49
-11	3475.11 *	3474.343 *	3469.846 *	3456.042 *	3438.622 *	3415.467 *	3385.674 *	3362.954 *	3330.535 *	3288.543 *	3242.424 *	3189.195 *	3115.616 *	3004.909 *	2847.066 *	2671.787 *	2494.293 *	2283.345 *	1897.048 *	1162.115 *	375.648	3.62	0.49
-13	3474.74 *	3471.652 *	3466.709 *	3452.741 *	3432.091 *	3410.899 *	3382.115 *	3349.561 *	3323.043 *	3288.609 *	3230.527 *	3161.607 *	3098.481 *	3000.822 *	2856.072 *	2651.689 *	2446.187 *	2245.71 *	1877.637 *	1146.634 *	367.139	3.313	0.49
-15	3495 *	3489.825 *	3483.38 *	3470.086 *	3447.694 *	3423.287 *	3396.998 *	3363.393 *	3329.448 *	3298.321 *	3246.634 *	3165.106 *	3086.803 *	2999.934 *	2864.544 *	2664.703 *	2413.597 *	2207.232 *	1852.681 *	1128.101 *	357.507	3.229	0.49
-17	3529.42 *	3522.598 *	3513.949 *	3502.848 *	3478.07 *	3454.247 *	3426.34 *	3392.661 *	3354.502 *	3319.592 *	3269.175 *	3187.384 *	3094.22 *	3002.916 *	2873.45 *	2673.349 *	2412.381 *	2168.264 *	1827.474 *	1106.313 *	346.778	3.129	0.49
-19.5	3574.41 *	3568.197 *	3557.836 *	3549.918 *	3520.901 *	3494.238 *	3471.302 *	3429.125 *	3387.835 *	3349.761 *	3303.304 *	3211.241 *	3111.596 *	3007.855 *	2883.978 *	2676.92 *	2396.344 *	2129.121 *	1793.225 *	1074.139 *	331.869	2.982	0.49
-22.5	3570.255 *	3566.473 *	3557.484 *	3548.067 *	3522.551 *	3493.905 *	3467.702 *	3436.843 *	3387.96 *	3341.525 *	3293.104 *	3216.642 *	3095.584 *	2973.132 *	2873.964 *	2664.344 *	2357.094 *	2061.401 *	1748.78 *	1029.906 *	312.317	2.775	0.49
-25.5	3440.38 *	3442.044 *	3438.729 *	3428.118 *	3406.335 *	3382.551 *	3356.479 *	3331.656 *	3289.705 *	3235.085 *	3180.105 *	3132.347 *	3015.285 *	2864.474 *	2746.438 *	2623.025 *	2277.189 *	1970.797 *	1658.349 *	972.28 *	290.741	2.535	0.49
-29	3107.33 *	3117.005 *	3120.172 *	3111.547 *	3090.217 *	3076.476 *	3060.553 *	3037.738 *	3005.969 *	2962.995 *	2915.884 *	2875.122 *	2799.1 *	2656.582 *	2533.148 *	2432.777 *	2143.881 *	1839.603 *	1546.722 *	898.862 *	262.571	2.213	0.49
-33	2657.07 *	2665.766 *	2671.917 *	2668.034 *	2651.846 *	2643.125 *	2636.913 *	2622.901 *	2594.127 *	2552.181 *	2529.395 *	2502.336 *	2438.632 *	2314.28 *	2245.784 *	2155.736 *	1926.369 *	1668.423 *	1409.722 *	805.011 *	227.092	1.792	0.49
-37.5	2351.08 *	2352.016 *	2350.344 *	2343.477 *	2333.83 *	2316.187 *	2308.421 *	2293.741 *	2270.039 *	2240.504 *	2200.23 *	2179.357 *	2120.437 *	2025.948 *	1952.324 *	1875.082 *	1666.578 *	1469.06 *	1236.996 *	668.313 *	182.769	1.343	0.49
-42.5	2075.685 *	2078.208 *	2079.344 *	2075.204 *	2065.738 *	2051.144 *	2033.433 *	2022.597 *	2003.207 *	1983.088 *	1947.636 *	1901.367 *	1839.339 *	1760.269 *	1684.538 *	1580.153 *	1384.468 *	1233.949 *	1007.825 *	500.782 *	129.148	1.224	0.49
-47.5	1529.305 *	1539.993 *	1554.01 *	1558.65 *	1554.453 *	1540.778 *	1517.128 *	1509.559 *	1503.048 *	1494.162 *	1472.219 *	1427.576 *	1363.142 *	1311.363 *	1270.809 *	1177.115 *	990.673 *	908.999 *	699.897 *	358.21	75.775	1.092	0.49
-55	339.77	349.194	368.031	370.899	373.073	368.445	356.442	353.662	376.085	388.089	390.283	367.591	330.616	389.796	403.494 *	329.77	336.402	374.233	22				

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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0	0	0
55	1.1	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2	2.4	2.8	2.7	2.8	3	3.1	2.9	2.4	2.7	1.9	0.6	0.1	0	0	0
47.5	2.65 *	5.34 *	5.35 *	5.32 *	5.27 *	5.18 *	5.06 *	4.90 *	4.73 *	5.75 *	6.71 *	6.33 *	6.74 *	7.12 *	7.39 *	6.92 *	5.60 *	6.27 *	4.4	1.3	0.1	0	0	0
42.5	2.71 *	5.43 *	5.41 *	5.38 *	5.33 *	5.25 *	5.15 *	5.03 *	4.90 *	5.96 *	6.95 *	6.67 *	7.25 *	7.61 *	7.88 *	7.64 *	6.17 *	6.84 *	4.94 *	1.4	0.1	0	0	0
37.5	3.38 *	6.78 *	6.77 *	6.73 *	6.64 *	6.50 *	6.40 *	6.32 *	6.23 *	7.57 *	8.70 *	8.40 *	9.41 *	9.82 *	9.94 *	9.91 *	8.14 *	8.88 *	6.55 *	2	0.2	0	0	0
33	3.85 *	7.70 *	7.68 *	7.63 *	7.53 *	7.38 *	7.25 *	7.15 *	7.03 *	8.55 *	9.82 *	9.42 *	10.53 *	11.05 *	10.99 *	10.80 *	8.98 *	9.70 *	7.21 *	2.28 *	0.2	0	0	0
29	3.98 *	7.95 *	7.91 *	7.83 *	7.74 *	7.63 *	7.51 *	7.37 *	7.22 *	8.78 *	10.17 *	9.76 *	10.75 *	11.26 *	11.31 *	10.97 *	9.02 *	9.77 *	7.30 *	2.37 *	0.3	0	0	0
25.5	3.71 *	7.39 *	7.35 *	7.28 *	7.20 *	7.09 *	6.98 *	6.86 *	6.72 *	8.18 *	9.49 *	9.11 *	9.99 *	10.47 *	10.64 *	10.29 *	8.40 *	9.26 *	6.99 *	2.28 *	0.3	0	0	0
22.5	3.22 *	6.42 *	6.39 *	6.33 *	6.26 *	6.17 *	6.08 *	5.98 *	5.87 *	7.16 *	8.32 *	7.96 *	8.73 *	9.20 *	9.38 *	9.05 *	7.44 *	8.35 *	6.38 *	2.09 *	0.2	0	0	0
19.5	3.22 *	6.41 *	6.37 *	6.32 *	6.25 *	6.16 *	6.08 *	5.98 *	5.88 *	7.19 *	8.34 *	7.98 *	8.77 *	9.29 *	9.47 *	9.14 *	7.57 *	8.60 *	6.62 *	2.19 *	0.3	0	0	0
17	2.67 *	5.32 *	5.29 *	5.25 *	5.19 *	5.13 *	5.06 *	4.99 *	4.90 *	5.99 *	6.95 *	6.64 *	7.32 *	7.78 *	7.93 *	7.65 *	6.36 *	7.28 *	5.64 *	1.89 *	0.2	0	0	0
15	2.14 *	4.26 *	4.24 *	4.20 *	4.16 *	4.12 *	4.07 *	4.01 *	3.94 *	4.81 *	5.58 *	5.33 *	5.89 *	6.27 *	6.38 *	6.14 *	5.12 *	5.89 *	4.58 *	1.55 *	0.2	0	0	0
13	2.16 *	4.29 *	4.26 *	4.23 *	4.20 *	4.16 *	4.11 *	4.05 *	3.98 *	4.85 *	5.62 *	5.38 *	5.96 *	6.34 *	6.41 *	6.16 *	5.17 *	5.96 *	4.64 *	1.58 *	0.2	0	0	0
11	2.19 *	4.35 *	4.32 *	4.30 *	4.27 *	4.23 *	4.18 *	4.11 *	4.04 *	4.92 *	5.70 *	5.47 *	6.06 *	6.40 *	6.45 *	6.22 *	5.24 *	6.03 *	4.68 *	1.61 *	0.2	0	0	0
9	2.24 *	4.45 *	4.42 *	4.40 *	4.38 *	4.34 *	4.28 *	4.20 *	4.12 *	5.02 *	5.83 *	5.59 *	6.16 *	6.48 *	6.53 *	6.30 *	5.30 *	6.08 *	4.72 *	1.63 *	0.2	0	0	0
7	2.30 *	4.57 *	4.54 *	4.54 *	4.51 *	4.46 *	4.39 *	4.31 *	4.22 *	5.15 *	5.97 *	5.71 *	6.26 *	6.57 *	6.62 *	6.39 *	5.36 *	6.14 *	4.74 *	1.64 *	0.2	0	0	0
5	2.36 *	4.69 *	4.68 *	4.68 *	4.64 *	4.57 *	4.50 *	4.41 *	4.33 *	5.27 *	6.09 *	5.79 *	6.34 *	6.65 *	6.71 *	6.47 *	5.42 *	6.18 *	4.76 *	1.66 *	0.2	0	0	0
3	2.40 *	4.77 *	4.78 *	4.77 *	4.71 *	4.65 *	4.57 *	4.48 *	4.39 *	5.33 *	6.15 *	5.84 *	6.39 *	6.72 *	6.78 *	6.54 *	5.47 *	6.22 *	4.78 *	1.67 *	0.2	0	0	0
1	2.41 *	4.81 *	4.81 *	4.78 *	4.72 *	4.66 *	4.58 *	4.49 *	4.39 *	5.33 *	6.15 *	5.86 *	6.43 *	6.77 *	6.84 *	6.60 *	5.51 *	6.24 *	4.78 *	1.67 *	0.2	0	0	0
0	1.20 *	2.39 *	2.39 *	2.37 *	2.34 *	2.31 *	2.27 *	2.23 *	2.18 *	2.66 *	3.08 *	2.93 *	3.23 *	3.40 *	3.44 *	3.32 *	2.77 *	3.13 *	2.39 *	0.83 *	0.1	0	0	0
	1.18 *	2.37 *	2.36 *	2.34 *	2.32 *	2.29 *	2.25 *	2.21 *	2.17 *	2.64 *	3.06 *	2.92 *	3.21 *	3.39 *	3.44 *	3.31 *	2.77 *	3.13 *	2.39 *	0.83 *	0.1	0	0	0

-1	2.31 *	4.62 *	4.61 *	4.58 *	4.54 *	4.48 *	4.40 *	4.33 *	4.24 *	5.17 *	5.99 *	5.73 *	6.31 *	6.68 *	6.78 *	6.56 *	5.50 *	6.24 *	4.78 *	1.66 *	0.2	0	0
-3	2.24 *	4.46 *	4.46 *	4.45 *	4.40 *	4.35 *	4.28 *	4.20 *	4.12 *	5.02 *	5.82 *	5.58 *	6.16 *	6.54 *	6.66 *	6.47 *	5.45 *	6.21 *	4.76 *	1.66 *	0.2	0	0
-5	2.18 *	4.33 *	4.33 *	4.32 *	4.29 *	4.24 *	4.17 *	4.10 *	4.02 *	4.90 *	5.68 *	5.43 *	6.00 *	6.39 *	6.53 *	6.37 *	5.39 *	6.17 *	4.74 *	1.64 *	0.2	0	0
-7	2.14 *	4.26 *	4.23 *	4.23 *	4.20 *	4.16 *	4.10 *	4.02 *	3.95 *	4.83 *	5.59 *	5.34 *	5.88 *	6.25 *	6.40 *	6.27 *	5.32 *	6.13 *	4.71 *	1.62 *	0.2	0	0
-9	2.12 *	4.21 *	4.18 *	4.17 *	4.15 *	4.11 *	4.05 *	3.98 *	3.90 *	4.77 *	5.54 *	5.31 *	5.84 *	6.17 *	6.28 *	6.16 *	5.26 *	6.08 *	4.67 *	1.60 *	0.2	0	0
-11	2.11 *	4.20 *	4.17 *	4.14 *	4.11 *	4.08 *	4.03 *	3.97 *	3.89 *	4.75 *	5.51 *	5.28 *	5.83 *	6.16 *	6.23 *	6.07 *	5.19 *	6.02 *	4.63 *	1.58 *	0.2	0	0
-13	2.12 *	4.21 *	4.18 *	4.15 *	4.11 *	4.08 *	4.03 *	3.97 *	3.90 *	4.76 *	5.51 *	5.28 *	5.84 *	6.19 *	6.25 *	6.03 *	5.12 *	5.96 *	4.57 *	1.55 *	0.2	0	0
-15	2.14 *	4.25 *	4.22 *	4.18 *	4.14 *	4.09 *	4.05 *	3.99 *	3.92 *	4.79 *	5.54 *	5.29 *	5.85 *	6.21 *	6.27 *	6.02 *	5.07 *	5.88 *	4.51 *	1.51 *	0.2	0	0
-17	2.70 *	5.37 *	5.33 *	5.28 *	5.22 *	5.16 *	5.09 *	5.02 *	4.94 *	6.04 *	6.98 *	6.65 *	7.33 *	7.79 *	7.86 *	7.50 *	6.25 *	7.23 *	5.53 *	1.83 *	0.2	0	0
-20	3.26 *	6.49 *	6.44 *	6.38 *	6.30 *	6.22 *	6.13 *	6.03 *	5.92 *	7.24 *	8.39 *	7.97 *	8.75 *	9.30 *	9.40 *	8.89 *	7.32 *	8.45 *	6.46 *	2.11 *	0.3	0	0
-23	3.20 *	6.38 *	6.33 *	6.27 *	6.19 *	6.11 *	6.01 *	5.91 *	5.79 *	7.07 *	8.21 *	7.81 *	8.52 *	9.02 *	9.18 *	8.67 *	7.04 *	8.10 *	6.18 *	1.99 *	0.2	0	0
-26	3.49 *	6.97 *	6.92 *	6.85 *	6.77 *	6.68 *	6.58 *	6.46 *	6.32 *	7.71 *	8.97 *	8.58 *	9.35 *	9.85 *	10.08 *	9.59 *	7.75 *	8.86 *	6.74 *	2.16 *	0.3	0	0
-29	3.51 *	7.03 *	6.99 *	6.92 *	6.84 *	6.76 *	6.67 *	6.55 *	6.41 *	7.81 *	9.12 *	8.75 *	9.57 *	10.11 *	10.39 *	9.95 *	8.11 *	9.28 *	7.04 *	2.23 *	0.3	0	0
-33	3.43 *	6.86 *	6.82 *	6.76 *	6.68 *	6.61 *	6.53 *	6.42 *	6.27 *	7.64 *	8.92 *	8.58 *	9.40 *	9.98 *	10.28 *	9.87 *	8.11 *	9.29 *	6.98 *	2.15 *	0.2	0	0
-38	3.37 *	6.73 *	6.69 *	6.63 *	6.55 *	6.46 *	6.38 *	6.27 *	6.14 *	7.47 *	8.66 *	8.30 *	9.11 *	9.64 *	9.85 *	9.37 *	7.69 *	8.70 *	6.36 *	1.9	0.2	0	0
-43	2.75 *	5.50 *	5.48 *	5.43 *	5.35 *	5.25 *	5.16 *	5.09 *	4.99 *	6.07 *	6.99 *	6.63 *	7.26 *	7.70 *	7.79 *	7.27 *	5.93 *	6.60 *	4.68 *	1.4	0.1	0	0
-48	2.14 *	4.32 *	4.32 *	4.28 *	4.20 *	4.09 *	3.99 *	3.96 *	3.93 *	4.81 *	5.51 *	5.14 *	5.70 *	6.25 *	6.26 *	5.80 *	4.97 *	5.43 *	3.9	1.3	0.1	0	0
-55	0.6	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.2	1.4	1.7	1.5	1.7	2.1	2.1	2	2	2.1	1.7	0.7	0.1	0	0
-65	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.4	0.4	0.2	0	0	0
-75	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0
-85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	97.1	194	193	192	189	187	184	181	177	216	251	239	263	278	283	272	226	256	194	63.9	7.46	0.02	4145.1

4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	FFLED @ 52W / 5000K	Sample ID.	B1
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
119.99	60	0.471	56.4	0.998	3.66%
276.98	60	0.215	55.3	0.930	8.45%

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*****