

Photometric Test Report

Relevant Standards

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

Prepared For

RAB Lighting Inc.

Prepared By

Dongguan New Testing Centre Co., Ltd.

Prepare by:

Alan Wang

Engineer: Alan Wang
Date: 2023-11-15

Review by:

Vincent Yuan

Technical Lead: Vincent Yuan
Issue Date: 2023-11-15
Revised Date: N/A

1.0 Test Summary

DLC Technical Requirements V5.1

Outdoor Non-Cutoff and Semi-Cutoff Wall-Mounted Area Luminaires				
Requirement Category	Test Method	Requirements		Test Value
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		2575
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		145.5
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	300		2533
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	Standard	Premium	143.1
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		17.7
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2014	20.00%	120V	5.05
			277V	20.56
Power Factor (THD & PF – Section 4.3)	ANSI C82.77:2014	0.9	120V	0.989
			277V	0.816
Allowable CCTs* (K) (Integrating Sphere – Section 4.1)	IES LM-79-2008	7 steps	3985±275	3878
		4 steps	3985±154	
Minimum CRI (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	≥70		83.9
Minimum R9 (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	N/A		15
Minimum Rf (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	≥70		84
Minimum Rg (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	≥89		96
IES Rcs,h1 (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-12%
Zonal Lumen Requirement (80°-90°) (Goniophotometer – Section 4.2)	IES LM-79-2008	≤10%		2.1%
Input Voltage (V)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Cast		277.0
(Goniophotometer – Section 4.2)		Non-Worst Case		120.0
Input Current (A)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		0.078
(Goniophotometer – Section 4.2)		Non-Worst Case		0.141
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		17.7
(Goniophotometer – Section 4.2)		Non-Worst Case		16.7

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023-11-02	WPX1 @ 15W / 4000K	231101002-S1
2	Goniophotometer Test	2023-11-02	WPX1 @ 15W / 4000K	231101002-S1
3	THD and PF Test	2023-11-02	WPX1 @ 15W / 4000K	231101002-S1

Remark (If any)

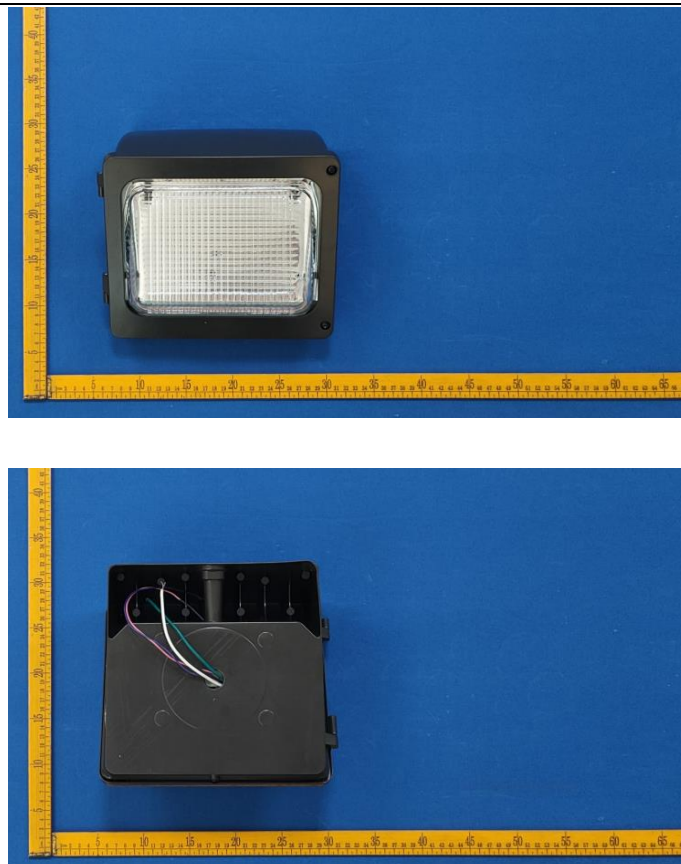
1. The results contained in this report pertain only to the tested samples.
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3. This report does not imply product certification, approval, or endorsement by NVLAP, or any agency of the Federal Government.

3.0 Product Description

Luminaire Description: Model No. WPX1 @ 15W / 4000K, color tunable from 3000K, 4000K and 5000K.

Electrical Specification: 120-277Vac, 50/60Hz

Photos of Luminaire Characteristics



4.0 LM-79 Measurement and Test Results

4.1 Integrating Sphere Test

Model No.	WPX1 @ 15W / 4000K	Sample ID	231101002-S1
Operate time (Min.)	10	Stabilization time (Min.)	60
Temperature (°C)	25.4	Humidity (%RH)	41.0

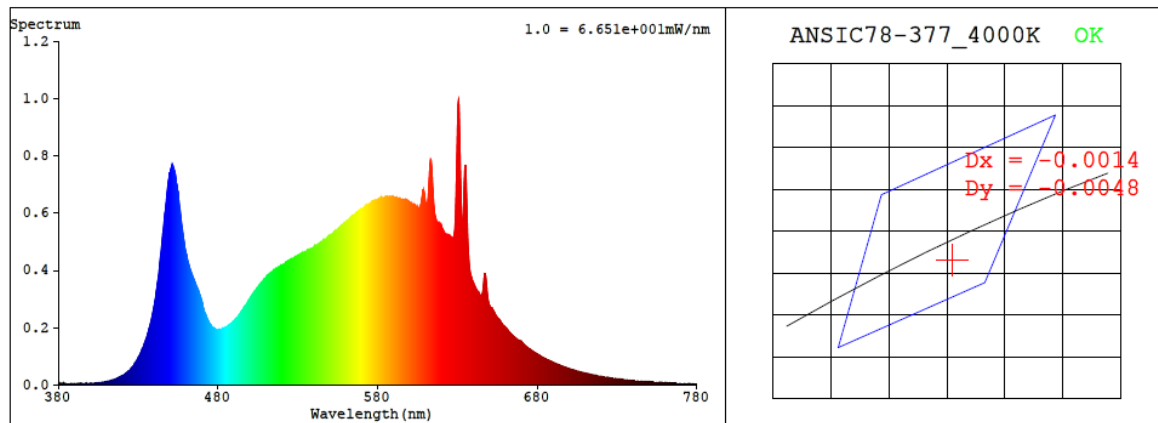
Test Method
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.</p> <p>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.</p> <p>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 780nm.</p>

Test Result

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.0	60	0.141	16.7	0.989
277.0	60	0.078	17.7	0.816

CCT (K)	CRI	R9	Duv	Rf	Rg	IES Rcs,h1
3878	83.9	15	-0.0019	84	96	-12%

4.1 Integrating Sphere Test



Colorimetric Parameters

Chromaticity Coordinate: x = 0.3846 y = 0.3753 / u' = 0.2284 v' = 0.5016 (duv=-1.86e-03)

CCT= 3878K Prcp WL: Ld=580.5nm Purity=28.0%

Peak WL: Lp=631nm FWHM: =96.2nm Ratio:R=19.0% G=77.4% B=3.6%

Render Index: Ra = 83.9 AvgR = 77.9 TM30:Rf=84 Rg=96

EEI: 0.09494 A++ Highest

R1 =83 R2 =91 R3 =95 R4 =82 R5 =83 R6 =86 R7 =86

R8 =66 R9 =15 R10=77 R11=81 R12=64 R13=85 R14=98 R15=77

4.1 Integrating Sphere Test

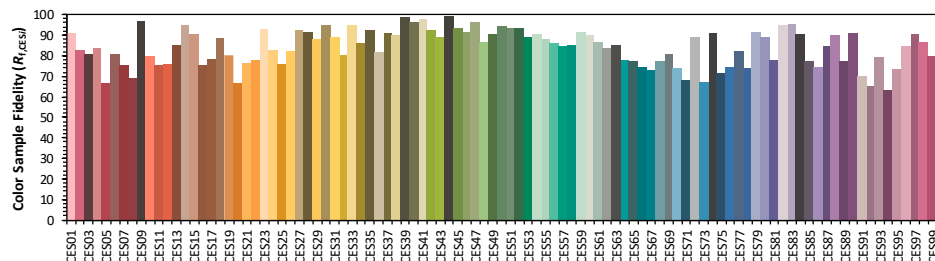
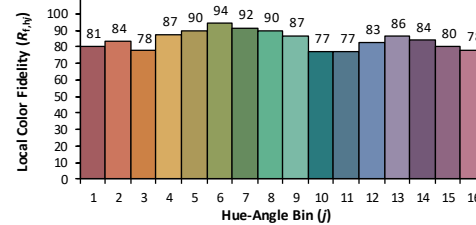
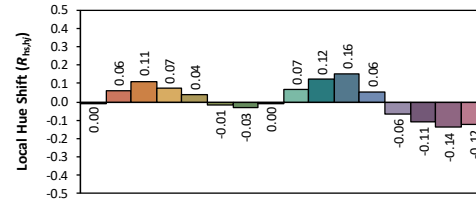
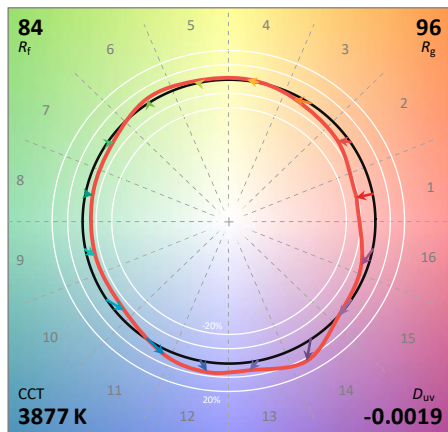
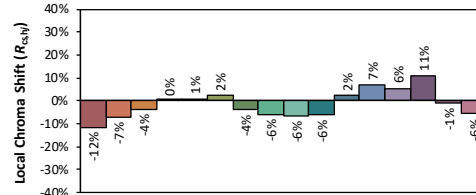
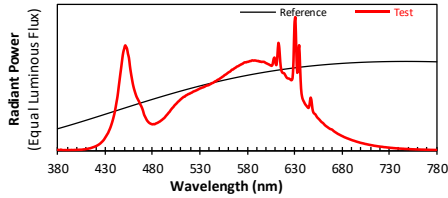
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2023/11/15

Model: WPX1 @ 15W / 4000K



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

x 0.3846
 y 0.3752
 u' 0.2285
 v' 0.5015

CIE 13.3-1995
(CRI)

R_a 84
 R_g 15

4.1 Integrating Sphere Test

Spectral Distribution over Visible Wavelength											
WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)
380	5.80E-06	447	6.14E-04	514	3.93E-04	581	6.47E-04	648	3.65E-04	715	3.47E-05
381	4.20E-06	448	6.70E-04	515	4.01E-04	582	6.50E-04	649	3.07E-04	716	3.38E-05
382	4.80E-06	449	7.16E-04	516	4.04E-04	583	6.53E-04	650	2.79E-04	717	3.27E-05
383	6.90E-06	450	7.42E-04	517	4.08E-04	584	6.53E-04	651	2.70E-04	718	3.16E-05
384	4.80E-06	451	7.66E-04	518	4.13E-04	585	6.57E-04	652	2.65E-04	719	3.05E-05
385	3.80E-06	452	7.57E-04	519	4.14E-04	586	6.57E-04	653	2.54E-04	720	2.97E-05
386	3.10E-06	453	7.42E-04	520	4.19E-04	587	6.56E-04	654	2.43E-04	721	2.86E-05
387	3.80E-06	454	7.04E-04	521	4.21E-04	588	6.57E-04	655	2.36E-04	722	2.79E-05
388	3.80E-06	455	6.77E-04	522	4.25E-04	589	6.56E-04	656	2.29E-04	723	2.73E-05
389	2.70E-06	456	6.20E-04	523	4.30E-04	590	6.55E-04	657	2.21E-04	724	2.60E-05
390	3.90E-06	457	5.71E-04	524	4.33E-04	591	6.53E-04	658	2.13E-04	725	2.50E-05
391	2.70E-06	458	5.31E-04	525	4.35E-04	592	6.53E-04	659	2.06E-04	726	2.46E-05
392	4.00E-06	459	4.92E-04	526	4.38E-04	593	6.49E-04	660	2.02E-04	727	2.39E-05
393	3.60E-06	460	4.61E-04	527	4.41E-04	594	6.50E-04	661	1.95E-04	728	2.28E-05
394	4.70E-06	461	4.36E-04	528	4.45E-04	595	6.46E-04	662	1.87E-04	729	2.22E-05
395	4.10E-06	462	4.14E-04	529	4.49E-04	596	6.47E-04	663	1.81E-04	730	2.13E-05
396	3.80E-06	463	3.94E-04	530	4.53E-04	597	6.47E-04	664	1.76E-04	731	2.08E-05
397	4.50E-06	464	3.80E-04	531	4.55E-04	598	6.47E-04	665	1.71E-04	732	1.96E-05
398	4.70E-06	465	3.67E-04	532	4.59E-04	599	6.42E-04	666	1.66E-04	733	1.96E-05
399	4.30E-06	466	3.53E-04	533	4.60E-04	600	6.38E-04	667	1.61E-04	734	1.87E-05
400	5.70E-06	467	3.37E-04	534	4.63E-04	601	6.35E-04	668	1.57E-04	735	1.79E-05
401	5.40E-06	468	3.24E-04	535	4.66E-04	602	6.31E-04	669	1.55E-04	736	1.76E-05
402	5.80E-06	469	3.08E-04	536	4.71E-04	603	6.28E-04	670	1.52E-04	737	1.67E-05
403	6.30E-06	470	2.89E-04	537	4.73E-04	604	6.23E-04	671	1.45E-04	738	1.64E-05
404	6.30E-06	471	2.63E-04	538	4.75E-04	605	6.22E-04	672	1.40E-04	739	1.61E-05
405	6.50E-06	472	2.49E-04	539	4.77E-04	606	6.18E-04	673	1.35E-04	740	1.53E-05
406	7.40E-06	473	2.35E-04	540	4.80E-04	607	6.31E-04	674	1.31E-04	741	1.47E-05
407	8.60E-06	474	2.22E-04	541	4.84E-04	608	6.68E-04	675	1.26E-04	742	1.44E-05
408	8.80E-06	475	2.12E-04	542	4.87E-04	609	6.77E-04	676	1.22E-04	743	1.41E-05
409	1.00E-05	476	2.05E-04	543	4.93E-04	610	6.37E-04	677	1.18E-04	744	1.35E-05
410	1.15E-05	477	2.00E-04	544	4.94E-04	611	6.25E-04	678	1.15E-04	745	1.35E-05
411	1.26E-05	478	1.96E-04	545	4.99E-04	612	6.93E-04	679	1.11E-04	746	1.26E-05
412	1.40E-05	479	1.93E-04	546	5.04E-04	613	7.84E-04	680	1.07E-04	747	1.22E-05
413	1.60E-05	480	1.91E-04	547	5.06E-04	614	7.48E-04	681	1.04E-04	748	1.20E-05
414	1.67E-05	481	1.93E-04	548	5.12E-04	615	6.48E-04	682	1.00E-04	749	1.16E-05
415	1.92E-05	482	1.92E-04	549	5.17E-04	616	5.91E-04	683	9.73E-05	750	1.14E-05
416	2.14E-05	483	1.95E-04	550	5.19E-04	617	5.71E-04	684	9.44E-05	751	1.08E-05
417	2.41E-05	484	1.99E-04	551	5.24E-04	618	5.66E-04	685	9.17E-05	752	1.05E-05
418	2.62E-05	485	2.01E-04	552	5.29E-04	619	5.64E-04	686	8.87E-05	753	1.01E-05
419	2.91E-05	486	2.05E-04	553	5.33E-04	620	5.54E-04	687	8.66E-05	754	9.80E-06
420	3.19E-05	487	2.10E-04	554	5.39E-04	621	5.41E-04	688	8.37E-05	755	9.50E-06
421	3.52E-05	488	2.13E-04	555	5.43E-04	622	5.31E-04	689	8.11E-05	756	9.20E-06
422	3.92E-05	489	2.19E-04	556	5.50E-04	623	5.27E-04	690	7.84E-05	757	9.00E-06
423	4.32E-05	490	2.24E-04	557	5.53E-04	624	5.25E-04	691	7.58E-05	758	8.50E-06
424	4.81E-05	491	2.30E-04	558	5.58E-04	625	5.22E-04	692	7.35E-05	759	8.40E-06
425	5.36E-05	492	2.35E-04	559	5.63E-04	626	5.17E-04	693	7.16E-05	760	8.10E-06
426	6.05E-05	493	2.42E-04	560	5.69E-04	627	5.13E-04	694	6.93E-05	761	7.80E-06
427	6.71E-05	494	2.52E-04	561	5.73E-04	628	5.28E-04	695	6.68E-05	762	7.80E-06
428	7.47E-05	495	2.59E-04	562	5.76E-04	629	6.52E-04	696	6.47E-05	763	7.50E-06
429	8.41E-05	496	2.67E-04	563	5.83E-04	630	9.18E-04	697	6.26E-05	764	7.00E-06
430	9.54E-05	497	2.76E-04	564	5.90E-04	631	9.70E-04	698	6.07E-05	765	6.90E-06
431	1.06E-04	498	2.83E-04	565	5.91E-04	632	7.22E-04	699	5.85E-05	766	6.90E-06
432	1.18E-04	499	2.94E-04	566	5.97E-04	633	5.67E-04	700	5.66E-05	767	6.60E-06
433	1.29E-04	500	3.03E-04	567	6.02E-04	634	6.74E-04	701	5.50E-05	768	6.50E-06
434	1.45E-04	501	3.11E-04	568	6.06E-04	635	7.68E-04	702	5.35E-05	769	6.20E-06
435	1.61E-04	502	3.18E-04	569	6.11E-04	636	6.06E-04	703	5.19E-05	770	5.70E-06
436	1.79E-04	503	3.28E-04	570	6.14E-04	637	4.52E-04	704	5.01E-05	771	5.80E-06
437	2.01E-04	504	3.35E-04	571	6.17E-04	638	3.95E-04	705	4.81E-05	772	5.70E-06
438	2.24E-04	505	3.41E-04	572	6.23E-04	639	3.71E-04	706	4.71E-05	773	5.40E-06
439	2.51E-04	506	3.49E-04	573	6.25E-04	640	3.57E-04	707	4.54E-05	774	5.10E-06
440	2.80E-04	507	3.57E-04	574	6.30E-04	641	3.43E-04	708	4.40E-05	775	5.00E-06
441	3.17E-04	508	3.61E-04	575	6.32E-04	642	3.32E-04	709	4.24E-05	776	4.90E-06
442	3.57E-04	509	3.70E-04	576	6.38E-04	643	3.24E-04	710	4.12E-05	777	4.70E-06
443	3.98E-04	510	3.75E-04	577	6.42E-04	644	3.15E-04	711	3.97E-05	778	4.60E-06
444	4.53E-04	511	3.81E-04	578	6.44E-04	645	3.12E-04	712	3.87E-05	779	4.60E-06
445	5.08E-04	512	3.87E-04	579	6.43E-04	646	3.36E-04	713	3.74E-05	780	4.60E-06
446	5.62E-04	513	3.92E-04	580	6.47E-04	647	3.85E-04	714	3.58E-05	N/A	N/A

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	WPX1 @ 15W / 4000K	Sample ID	231101002-S1
Operate time (Min.)	30	Stabilization time (Min.)	60
Temperature (°C)	24.8	Humidity (%RH)	42.9

Test Method
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using a type C goniophotometer and software.</p> <p>The ambient temperature shall be maintained at $25 \pm 1^{\circ}\text{C}$, measured at a point not more than 1 m from the sample and at the same height as the sample.</p> <p>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.</p> <p>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 1.0° vertical intervals and 15° horizontal intervals.</p>

Test Conditions

Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
WORST CASE	277.0	60	0.078	17.7	0.816
NON-WORST CASE	120.0	60	0.141	16.7	0.989

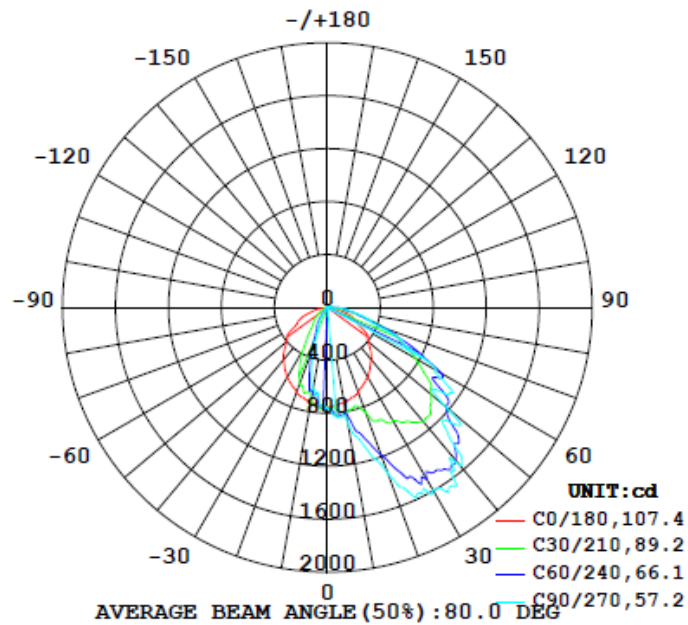
Test Result

Result Type	Flux (lm)	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)	Zonal Lumen Requirement (80°-90°)	BUG
		C0-180	C90-270	C0-180	C90-270			
0°-180° zones	2575	108.9	146.7	56.0	96.6	145.5	2.1%	B1-U2-G1
0°-90° zones	2533	108.9	146.7	56.0	96.6	143.1	2.1%	B1-U2-G1

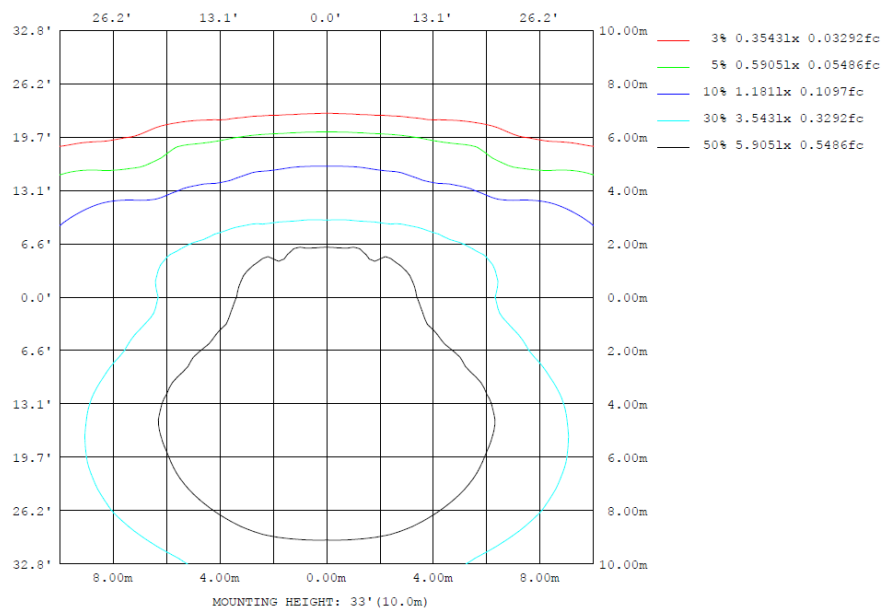
4.2 Goniophotometer Test

Lighting Distribution Curve

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM



Isolux Plot



4.2 Goniophotometer Test

Zonal Lumen Summary

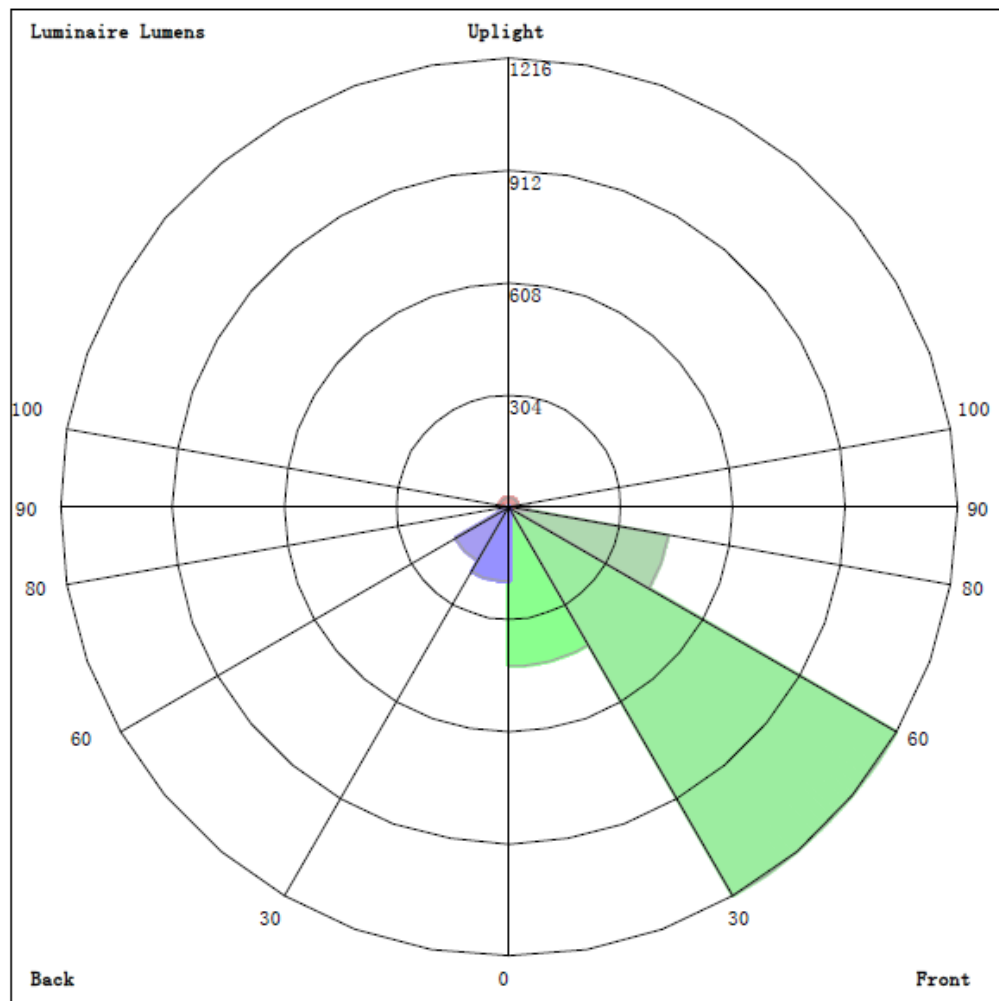
ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	zone	total	%lum, lamp
10	724.5	824.8	879.9	824.8	724.5	654.1	632.4	654.1	0- 10	72.08	72.08	2.8,2.8
20	681.1	1041	1334	1041	681.1	454.9	241.7	454.9	10- 20	211.4	283.5	11,11
30	610.1	1313	1594	1313	610.1	195.8	120.9	195.8	20- 30	348.3	631.8	24.5,24.5
40	518.1	1314	1561	1314	518.1	107.7	35.00	107.7	30- 40	455.7	1088	42.2,42.2
50	402.3	1178	1154	1178	402.3	36.63	16.04	36.63	40- 50	487.8	1575	61.2,61.2
60	279.6	854.1	948.6	854.1	279.6	13.86	0.3260	13.86	50- 60	438.4	2014	78.2,78.2
70	188.1	472.1	393.0	472.1	188.1	2.477	0.4714	2.477	60- 70	317.4	2331	90.5,90.5
80	65.34	163.1	171.2	163.1	65.34	1.098	0.4801	1.098	70- 80	147.6	2479	96.3,96.3
90	8.936	62.47	57.01	62.47	8.936	0.7257	0.5760	0.7257	80- 90	54.27	2533	98.4,98.4
100	6.011	19.81	30.58	19.81	6.011	0.7915	0.7906	0.7915	90-100	16.50	2550	99,99
110	5.643	7.619	22.65	7.619	5.643	0.7211	0.8234	0.7211	100-110	7.727	2557	99.3,99.3
120	4.509	15.29	8.452	15.29	4.509	0.6888	0.8696	0.6888	110-120	5.483	2563	99.5,99.5
130	1.823	12.21	13.62	12.21	1.823	0.7415	1.040	0.7415	120-130	5.677	2568	99.7,99.7
140	0.4707	7.456	10.89	7.456	0.4707	0.8211	1.078	0.8211	130-140	3.797	2572	99.9,99.9
150	0.4357	3.653	5.142	3.653	0.4357	0.9170	1.050	0.9170	140-150	1.919	2574	100,100
160	0.5136	0.4086	1.763	0.4086	0.5136	0.9713	0.9322	0.9713	150-160	0.6481	2575	100,100
170	0.6194	0.5999	0.4898	0.5999	0.6194	0.8147	0.7110	0.8147	160-170	0.2145	2575	100,100
180	0.7129	0.6297	0.5783	0.6297	0.7129	0.6594	0.6189	0.6594	170-180	0.0659	2575	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

	Zonal (lm)		Total (lm)	Percent
0-10	72.08	0-10	72.08	2.80%
10-20	211.42	0-20	283.50	11.01%
20-30	348.32	0-30	631.82	24.54%
30-40	455.71	0-40	1087.53	42.23%
40-50	487.83	0-50	1575.36	61.18%
50-60	438.41	0-60	2013.77	78.20%
60-70	317.39	0-70	2331.16	90.53%
70-80	147.62	0-80	2478.78	96.26%
80-90	54.27	0-90	2533.05	98.37%
90-100	16.50	0-100	2549.55	99.01%
100-110	7.73	0-110	2557.28	99.31%
110-120	5.48	0-120	2562.76	99.52%
120-130	5.68	0-130	2568.44	99.74%
130-140	3.80	0-140	2572.24	99.89%
140-150	1.92	0-150	2574.16	99.97%
150-160	0.65	0-160	2574.81	99.99%
160-170	0.21	0-170	2575.02	100.00%
170-180	0.07	0-180	2575.09	100.00%

4.2 Goniophotometer Test

LCS/BUG

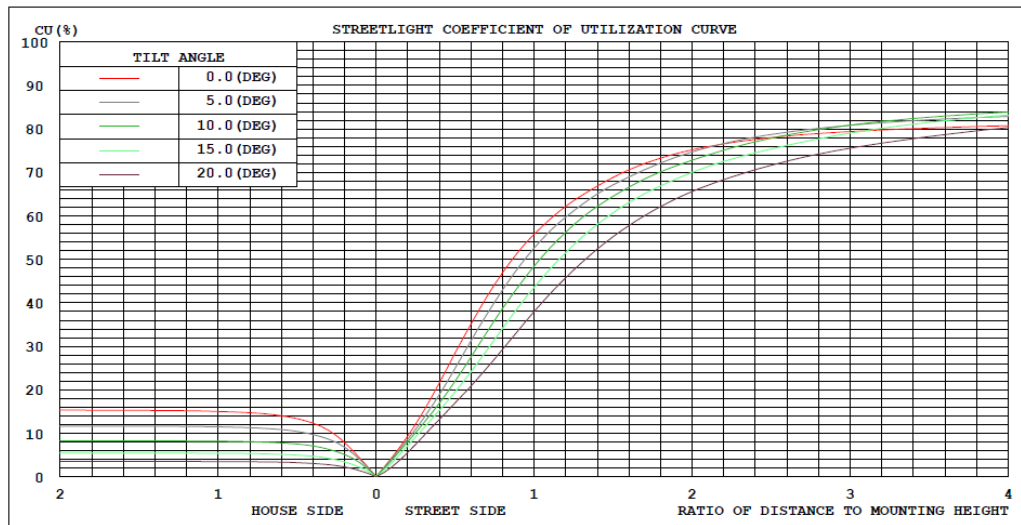


LUMINAIRE CLASSIFICATION SYSTEM (LCS)

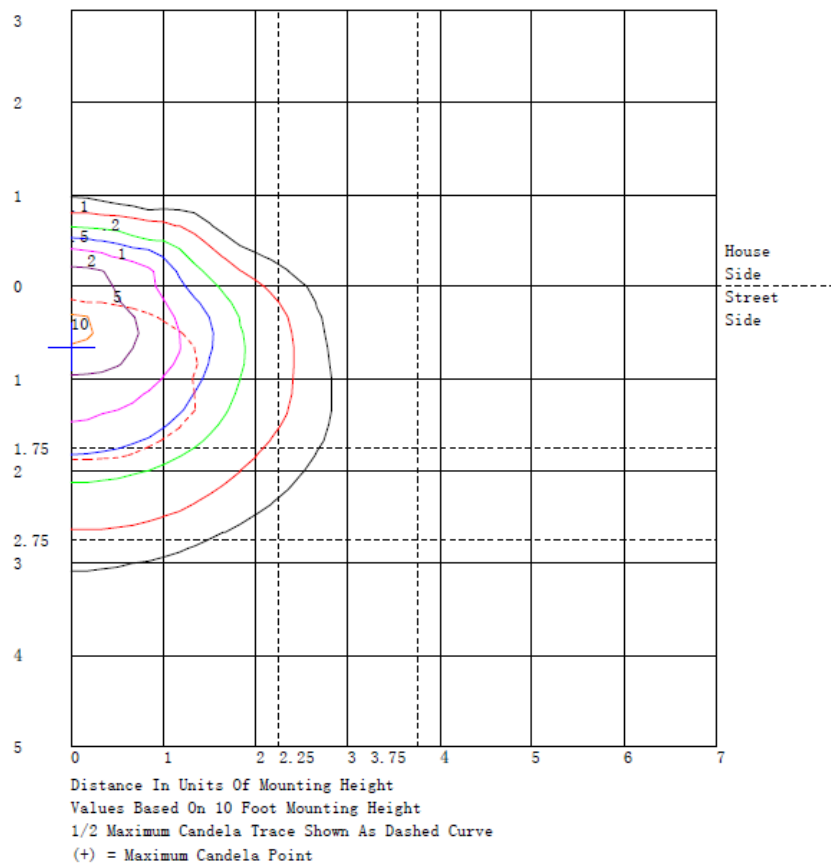
	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	430.9	N.A.	16.7
FM - Front-Medium (30-60)	1215.9	N.A.	47.2
FH - Front-High (60-80)	438.4	N.A.	17.0
FVH - Front-Very High (80-90)	51.7	N.A.	2.0
BL - Back-Low (0-30)	200.9	N.A.	7.8
BM - Back-Medium (30-60)	166.0	N.A.	6.4
BH - Back-High (60-80)	26.6	N.A.	1.0
BVH - Back-Very High (80-90)	2.5	N.A.	0.1
UL - Uplight-Low (90-100)	16.5	N.A.	0.6
UH - Uplight-High (100-180)	25.5	N.A.	1.0
Total	2574.9	N.A.	100.0
BUG Rating	B1-U2-G1		

4.2 Goniophotometer Test

Coefficients of Utilization



Isolines



4.2 Goniophotometer Test

Luminous Distribution Intensity Data

Table--1

UNIT: cd

C (DEG) y (DEG)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	756	756	756	757	757	757	757	757	757	758	758	758	759	759	759	759	759	759	759
5	744	750	756	761	764	767	772	783	795	807	814	818	821	821	820	819	824	830	834
10	724	733	743	755	770	787	802	813	821	825	819	812	808	822	839	856	868	876	880
15	701	727	747	762	764	767	776	810	850	893	929	964	995	1025	1051	1071	1081	1084	1082
20	681	697	717	742	768	801	843	905	973	1041	1096	1145	1189	1227	1260	1287	1311	1327	1334
25	644	650	674	714	776	851	933	1012	1093	1176	1266	1351	1427	1480	1521	1550	1571	1582	1585
30	610	615	644	695	779	879	989	1102	1212	1313	1389	1450	1498	1537	1565	1584	1593	1595	1594
35	563	600	655	727	826	936	1050	1154	1252	1339	1403	1456	1502	1553	1596	1630	1644	1648	1644
40	518	567	637	728	860	998	1127	1202	1262	1314	1388	1454	1504	1506	1495	1484	1511	1540	1561
45	462	528	610	708	839	974	1100	1180	1243	1292	1345	1383	1401	1373	1329	1282	1255	1236	1226
50	402	474	559	656	783	910	1025	1097	1147	1178	1178	1171	1168	1211	1255	1284	1244	1195	1154
55	373	477	577	671	767	852	922	957	976	985	988	991	997	1026	1059	1090	1108	1120	1125
60	280	389	488	575	652	717	771	803	828	854	907	956	992	979	953	927	931	940	949
65	242	330	407	474	528	574	613	655	691	717	725	722	711	689	665	642	632	627	626
70	188	224	264	309	368	425	471	482	481	472	469	465	458	447	436	424	412	401	393
75	119	148	176	205	239	268	290	289	281	270	267	267	269	276	283	290	295	297	297
80	65.3	85.3	103	118	131	142	151	157	161	163	164	165	165	165	165	166	168	170	171
85	24.0	32.2	40.9	50.2	60.8	71.3	81.2	88.2	94.5	100	108	115	122	126	130	132	135	136	136
90	8.94	13.2	18.2	24.1	31.4	39.1	46.5	52.9	58.4	62.5	64.3	64.8	64.1	61.6	58.8	56.3	56.1	56.5	57.0
95	6.45	9.91	13.4	17.1	21.4	25.3	28.4	29.0	28.8	28.3	28.4	28.8	29.4	30.8	32.4	33.9	35.3	36.4	36.9
100	6.01	6.42	6.88	7.39	7.53	8.03	9.20	12.5	16.3	19.8	21.5	22.6	23.6	25.1	26.6	28.0	29.2	30.1	30.6
105	1.05	2.56	3.87	4.99	5.75	6.43	7.12	8.08	9.16	10.4	11.7	13.1	14.6	15.9	17.1	18.3	19.6	20.7	21.3
110	5.64	4.89	4.93	5.76	8.35	11.0	13.0	11.3	9.13	7.62	10.0	13.4	16.8	18.7	20.1	21.1	21.9	22.4	22.7
115	5.06	4.03	3.85	4.54	6.71	9.28	11.8	13.4	14.2	14.0	10.9	7.46	4.58	5.30	6.84	8.55	8.71	8.51	8.08
120	4.51	3.44	3.16	3.68	5.38	7.57	9.96	11.9	13.7	15.3	16.8	18.0	18.4	17.5	15.9	14.0	11.6	9.54	8.45
125	3.30	2.51	2.37	2.87	4.25	6.09	8.18	10.2	12.2	14.1	15.8	17.3	18.4	19.3	19.6	19.4	17.4	15.5	14.2
130	1.82	1.40	1.47	2.02	3.23	4.80	6.61	8.44	10.3	12.2	14.2	15.9	17.3	17.9	18.0	17.6	16.1	14.6	13.6
135	0.60	0.00	0.00	0.32	1.69	3.45	5.38	6.95	8.52	10.1	12.1	13.9	15.4	15.8	15.8	15.3	14.3	13.4	12.8
140	0.47	1.18	1.87	2.52	3.06	3.64	4.30	5.19	6.24	7.46	9.14	10.8	12.1	12.6	12.7	12.4	11.8	11.2	10.9
145	0.44	0.81	1.21	1.63	2.06	2.54	3.08	3.73	4.47	5.29	6.41	7.48	8.35	8.61	8.61	8.45	8.17	7.91	7.76
150	0.44	0.69	0.83	0.86	0.56	0.32	0.33	1.29	2.47	3.65	4.31	4.77	5.08	5.25	5.31	5.30	5.24	5.17	5.14
155	0.46	0.46	0.47	0.48	0.45	0.47	0.60	1.03	1.54	2.04	2.37	2.61	2.80	2.90	2.97	3.00	3.05	3.08	3.10
160	0.51	0.51	0.51	0.50	0.49	0.47	0.46	0.40	0.37	0.41	0.66	0.96	1.26	1.44	1.57	1.67	1.72	1.75	1.76
165	0.56	0.57	0.57	0.57	0.56	0.54	0.53	0.51	0.50	0.50	0.53	0.57	0.59	0.56	0.51	0.47	0.44	0.43	0.43
170	0.62	0.63	0.64	0.64	0.64	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.58	0.57	0.56	0.55	0.53	0.50	0.49
175	0.67	0.67	0.67	0.67	0.67	0.68	0.68	0.67	0.67	0.67	0.66	0.66	0.64	0.62	0.58	0.56	0.54	0.53	0.53
180	0.71	0.72	0.73	0.72	0.71	0.69	0.66	0.65	0.64	0.63	0.63	0.64	0.65	0.65	0.64	0.63	0.61	0.59	0.58

UNIT: cd																				
C (DEG) y (DEG)		95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	0	759	759	759	759	759	759	758	758	758	757	757	757	757	757	757	756	756	756	757
5	5	830	824	819	820	821	821	818	814	807	795	783	772	767	764	761	756	750	744	752
10	10	876	868	856	839	822	808	812	819	825	821	813	802	787	770	755	743	733	724	736
15	15	1084	1081	1071	1051	1025	995	964	929	893	850	810	776	767	764	762	747	727	701	710
20	20	1327	1311	1287	1260	1227	1189	1145	1096	1041	973	905	843	801	768	742	717	697	681	673
25	25	1582	1571	1550	1521	1480	1427	1351	1266	1176	1093	1012	933	851	776	714	674	650	644	642
30	30	1595	1593	1584	1565	1537	1498	1450	1389	1313	1212	1102	989	879	779	695	644	615	610	624
35	35	1648	1644	1630	1596	1553	1502	1456	1403	1339	1252	1154	1050	936	826	727	655	600	563	582
40	40	1540	1511	1484	1495	1506	1504	1454	1388	1314	1262	1202	1127	998	860	728	637	567	518	540
45	45	1236	1255	1282	1329	1373	1401	1383	1345	1292	1243	1180	1100	974	839	708	610	528	462	448
50	50	1195	1244	1284	1255	1211	1168	1171	1178	1147	1097	1025	910	783	656	559	474	402	358	
55	55	1120	1108	1090	1059	1026	997	991	988	985	976	957	922	852	767	671	577	477	373	293
60	60	940	931	927	953	979	992	956	907	854	828	803	771	717	652	575	488	389	280	207
65	65	627	632	642	665	689	711	722	725	717	691	655	613	574	528	474	407	330	242	171
70	70	401	412	424	436	447	458	465	469	472	481	482	471	425	368	309	264	224	188	133
75	75	297	295	290	283	276	269	267	267	270	281	289	290	268	239	205	176	148	119	83.9
80	80	170	168	166	165	165	165	165	164	163	161	157	151	142	131	118	103	85.3	65.3	45.4
85	85	136	135	132	130	126	122	115	108	100	94.5	88.2	81.2	71.3	60.8	50.2	40.9	32.2	24.0	17.9
90	90	56.5	56.1	56.3	58.8	61.6	64.1	64.8	64.3	62.5	58.4	52.9	46.5	39.1	31.4	24.1	18.2	13.2	8.94	7.33
95	95	36.4	35.3	33.9	32.4	30.8	29.4	28.8	28.4	28.3	28.8	29.0	28.4	25.3	21.4	17.1	13.4	9.91	6.45	5.22
100	100	30.1	29.2	28.0	26.6	25.1	23.6	22.6	21.5	19.8	16.3	12.5	9.20	8.03	7.53	7.39	6.88	6.42	6.01	4.69
105	105	20.7	19.6	18.3	17.1	15.9	14.6	13.1	11.7	10.4	9.16	8.08	7.12	6.43	5.75	4.99	3.87	2.56	1.05	0.86
110	110	22.4	21.9	21.1	20.1	18.7	16.8	13.4	10.0	7.62	9.13	11.3	13.0	11.0	8.35	5.76	4.93	4.89	5.64	3.57
115	115	8.51	8.71	8.55	6.84	5.30	4.58	7.46	10.9	14.0	14.2	13.4	11.8	9.28	6.71	4.54	3.85	4.03	5.06	3.23
120	120	9.54	11.6	14.0	15.9	17.5	18.4	18.0	16.8	15.3	13.7	11.9	9.96	7.57	5.38	3.68	3.16	3.44	4.51	2.93
125	125	15.5	17.4	19.4	19.6	19.3	18.4	17.3	15.8	14.1	12.2	10.2	8.18	6.09	4.25	2.87	2.37	2.51	3.30	2.28
130	130	14.6	16.1	17.6	18.0	17.9	17.3	15.9	14.2	12.2	10.3	8.44	6.61	4.80	3.23	2.02	1.47	1.40	1.82	1.40
135	135	13.4	14.3	15.3	15.8	15.8	15.4	13.9	12.1	10.1	8.52	6.95	5.38	3.45	1.69	0.32	0.00	0.00	0.60	0.71
140	140	11.2	11.8	12.4	12.7	12.6	12.1	10.8	9.14	7.46	6.24	5.19	4.30	3.64	3.06	2.52	1.87	1.18	0.47	0.60
145	145	7.91	8.17	8.45	8.61	8.61	8.35	7.48	6.41	5.29	4.47	3.73	3.08	2.54	2.06	1.63	1.21	0.81	0.44	0.56
150	150	5.17	5.24	5.30	5.31	5.25	5.08	4.77	4.31	3.65	2.47	1.29	0.33	0.32	0.56	0.86	0.83	0.69	0.44	0.60
155	155	3.08	3.05	3.00	2.97	2.90	2.80	2.61	2.37	2.04	1.54	1.03	0.60	0.47	0.45	0.48	0.47	0.46	0.46	0.60
160	160	1.75	1.72	1.67	1.57	1.44	1.26	0.96	0.66	0.41	0.37	0.40	0.46	0.47	0.49	0.50	0.51	0.51	0.51	0.73
165	165	0.43	0.44	0.47	0.51	0.56	0.59	0.57	0.53	0.50	0.50	0.51	0.53	0.54	0.56	0.57	0.57	0.57	0.56	0.71
170	170	0.50	0.53	0.55	0.56	0.57	0.58	0.58	0.59	0.60	0.61	0.62	0.63	0.64	0.64	0.64	0.64	0.63	0.62	0.70
175	175	0.53	0.54	0.56	0.58	0.62	0.64	0.66	0.66	0.67	0.67	0.67	0.68	0.68	0.67	0.67	0.67	0.67	0.67	0.71
180	180	0.59	0.61	0.63	0.64	0.65	0.65	0.64	0.63	0.63	0.64	0.65	0.66	0.69	0.71	0.72	0.73	0.72	0.71	0.71

Table--3

UNIT: cd

C (DEG)	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
γ (DEG)	0	758	758	759	759	759	758	758	758	758	758	758	758	758	758	759	759	759	758
5	759	763	766	766	764	756	747	739	742	746	749	743	734	726	723	722	722	722	723
10	742	741	732	717	701	684	668	654	646	641	638	633	630	628	629	631	632	631	629
15	714	712	703	689	673	657	639	618	590	561	533	506	483	464	454	449	447	449	454
20	663	652	645	632	611	564	510	455	411	373	339	315	295	279	261	248	242	248	261
25	631	610	578	538	491	431	370	312	269	234	207	192	184	180	177	175	174	175	177
30	616	586	522	446	365	299	242	196	175	164	158	148	139	132	126	123	121	123	126
35	572	534	445	344	248	204	175	155	134	116	101	86.7	75.4	66.8	62.1	59.9	59.6	59.9	62.1
40	530	489	389	277	173	136	117	108	86.0	66.5	50.4	42.1	37.4	35.5	34.4	34.4	35.0	34.4	34.4
45	418	373	298	218	144	105	79.6	62.8	47.4	36.7	29.9	26.8	26.0	26.5	25.7	25.2	24.9	25.2	25.7
50	313	265	211	159	112	79.2	54.3	36.6	26.5	21.2	19.1	17.1	16.2	16.1	15.9	15.9	16.0	15.9	15.9
55	225	170	131	102	78.8	55.9	37.1	22.9	15.7	12.1	10.9	9.56	9.09	9.12	8.99	8.98	9.01	8.98	8.99
60	148	103	77.6	61.9	51.9	37.0	24.1	13.9	8.52	5.50	4.03	2.43	1.43	0.87	0.49	0.34	0.33	0.34	0.49
65	115	72.4	49.2	36.1	29.1	19.3	11.7	6.14	2.87	1.09	0.39	0.08	0.19	0.50	0.48	0.44	0.39	0.44	0.48
70	88.1	54.3	35.1	24.0	18.0	10.9	5.78	2.48	0.85	0.31	0.42	0.33	0.40	0.53	0.53	0.51	0.47	0.51	0.53
75	55.4	33.8	21.5	14.4	10.6	6.37	3.42	1.58	0.65	0.36	0.45	0.41	0.46	0.55	0.54	0.51	0.47	0.51	0.54
80	29.4	17.5	11.1	7.54	5.86	3.64	2.09	1.10	0.60	0.44	0.48	0.45	0.48	0.52	0.51	0.50	0.48	0.50	0.51
85	12.9	8.95	6.38	4.61	3.42	2.26	1.40	0.82	0.55	0.46	0.48	0.47	0.48	0.51	0.51	0.51	0.50	0.51	0.51
90	5.93	4.73	3.79	3.00	2.35	1.69	1.14	0.73	0.57	0.52	0.54	0.53	0.53	0.55	0.55	0.56	0.58	0.56	0.55
95	4.18	3.32	2.72	2.25	1.87	1.43	1.05	0.76	0.65	0.61	0.62	0.61	0.60	0.61	0.62	0.64	0.66	0.64	0.62
100	3.60	2.74	2.19	1.81	1.54	1.23	0.98	0.79	0.72	0.71	0.72	0.71	0.71	0.72	0.74	0.76	0.79	0.76	0.74
105	0.71	0.62	0.61	0.63	0.67	0.71	0.74	0.76	0.77	0.76	0.76	0.77	0.78	0.79	0.81	0.83	0.85	0.83	0.81
110	2.01	0.98	0.72	0.79	1.01	0.92	0.81	0.72	0.72	0.74	0.78	0.79	0.80	0.81	0.82	0.82	0.82	0.82	0.82
115	1.84	0.91	0.62	0.63	0.80	0.75	0.71	0.69	0.71	0.74	0.77	0.78	0.79	0.80	0.82	0.83	0.84	0.83	0.82
120	1.73	0.90	0.60	0.56	0.67	0.66	0.67	0.69	0.72	0.75	0.78	0.80	0.82	0.83	0.85	0.86	0.87	0.86	0.85
125	1.50	0.94	0.69	0.61	0.63	0.63	0.66	0.71	0.75	0.80	0.84	0.86	0.88	0.90	0.92	0.94	0.95	0.94	0.92
130	1.08	0.84	0.71	0.66	0.65	0.66	0.70	0.74	0.78	0.82	0.87	0.91	0.95	0.98	1.01	1.03	1.04	1.03	1.01
135	0.79	0.82	0.79	0.74	0.69	0.70	0.73	0.78	0.82	0.87	0.91	0.95	0.99	1.02	1.04	1.05	1.06	1.05	1.04
140	0.69	0.76	0.76	0.75	0.74	0.76	0.79	0.82	0.85	0.88	0.92	0.96	0.99	1.03	1.05	1.07	1.08	1.07	1.05
145	0.69	0.76	0.79	0.80	0.80	0.82	0.84	0.87	0.90	0.94	0.97	1.00	1.02	1.04	1.06	1.07	1.08	1.07	1.06
150	0.72	0.81	0.84	0.85	0.85	0.87	0.89	0.92	0.94	0.96	0.97	0.99	1.00	1.01	1.03	1.04	1.05	1.04	1.03
155	0.81	0.91	0.95	0.96	0.94	0.93	0.92	0.91	0.92	0.94	0.96	0.98	0.99	1.00	1.00	0.99	0.98	0.99	1.00
160	0.90	1.01	1.05	1.05	1.03	1.01	0.99	0.97	0.96	0.96	0.95	0.93	0.91	0.89	0.90	0.92	0.93	0.92	0.90
165	0.95	1.06	1.08	1.06	1.03	1.01	1.00	0.98	0.97	0.95	0.93	0.88	0.83	0.79	0.80	0.81	0.83	0.81	0.80
170	0.90	0.98	0.99	0.98	0.94	0.90	0.86	0.81	0.80	0.79	0.78	0.75	0.72	0.69	0.69	0.70	0.71	0.70	0.69
175	0.84	0.89	0.90	0.89	0.86	0.82	0.77	0.72	0.70	0.68	0.67	0.65	0.63	0.62	0.63	0.65	0.67	0.65	0.63
180	0.70	0.70	0.70	0.70	0.69	0.68	0.67	0.66	0.64	0.63	0.61	0.60	0.59	0.59	0.60	0.61	0.62	0.61	0.60

C (DEG)	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355				
γ (DEG)	0	758	758	758	758	758	758	758	759	759	759	759	758	758	757				
5	726	734	743	749	746	742	739	747	756	764	766	766	763	759	752				
10	628	630	633	638	641	646	654	668	684	701	717	732	741	742	736				
15	464	483	506	533	561	590	618	639	657	673	689	703	712	714	710				
20	279	295	315	339	373	411	455	510	564	611	632	645	652	663	673				
25	180	184	192	207	234	269	312	370	431	491	538	578	610	631	642				
30	132	139	148	158	164	175	196	242	299	365	446	522	586	616	624				
35	66.8	75.4	86.7	101	116	134	155	175	204	248	344	445	534	572	582				
40	35.5	37.4	42.1	50.4	66.5	86.0	108	117	136	173	277	389	489	530	540				
45	26.5	26.0	26.8	29.9	36.7	47.4	62.8	79.6	105	144	218	298	373	418	448				
50	16.1	16.2	17.1	19.1	21.2	26.5	36.6	54.3	79.2	112	159	211	265	313	358				
55	9.12	9.09	9.56	10.9	12.1	15.7	22.9	37.1	55.9	78.8	102	131	170	225	293				
60	0.87	1.43	2.43	4.03	5.50	8.52	13.9	24.1	37.0	51.9	61.9	77.6	103	148	207				
65	0.50	0.19	0.08	0.39	1.09	2.87	6.14	11.7	19.3	29.1	36.1	49.2	72.4	115	171				
70	0.53	0.40	0.33	0.42	0.31	0.85	2.48	5.78	10.9	18.0	24.0	35.1	54.3	88.1	133				
75	0.55	0.46	0.41	0.45	0.36	0.65	1.58	3.42	6.37	10.6	14.4	21.5	33.8	55.4	83.9				
80	0.52	0.48	0.45	0.48	0.44	0.60	1.10	2.09	3.64	5.86	7.54	11.1	17.5	29.4	45.4				
85	0.51	0.48	0.47	0.48	0.46	0.55	0.82	1.40	2.26	3.42	4.61	6.38	8.95	12.9	17.9				
90	0.55	0.53	0.53	0.54	0.52	0.57	0.73	1.14	1.69	2.35	3.00	3.79	4.73	5.93	7.33				
95	0.61	0.60	0.61	0.62	0.61	0.65	0.76	1.05	1.43	1.87	2.25	2.72	3.32	4.18	5.22				
100	0.72	0.71	0.71	0.72	0.71	0.72	0.79	0.98	1.23	1.54	1.81	2.19	2.74	3.60	4.69				
105	0.79	0.78	0.77	0.76	0.76	0.77	0.76	0.74	0.71	0.67	0.63	0.61	0.62	0.71	0.86				
110	0.81	0.80	0.79	0.78	0.74	0.72	0.72	0.81	0.92	1.01	0.79	0.72	0.98	2.01	3.57				
115	0.80	0.79	0.78	0.77	0.74	0.71	0.69	0.71	0.75	0.80	0.63	0.62	0.91	1.84	3.23				
120	0.83	0.82	0.80	0.78	0.75	0.72	0.69	0.67	0.66	0.67	0.56	0.60	0.90	1.73	2.93				
125	0.90	0.88	0.86	0.84	0.80	0.75	0.71	0.66	0.63	0.63	0.61	0.69	0.94	1.50	2.28				
130	0.98	0.95	0.91	0.87	0.82	0.78	0.74	0.70	0.66	0.65	0.66	0.71	0.84	1.08	1.40				
135	1.02	0.99	0.95	0.91	0.87	0.82	0.78	0.73	0.70	0.69	0.74	0.79	0.82	0.79	0.71				
140	1.03	0.99	0.96	0.92	0.88	0.85	0.82	0.79	0.76	0.74	0.75	0.76	0.76	0.69	0.60				
145	1.04	1.02	1.00	0.97	0.94	0.90	0.87	0.84	0.82	0.80	0.80	0.79	0.76	0.69	0.58				
150	1.01	1.00	0.99	0.97	0.96	0.94	0.92	0.89	0.87	0.85	0.85	0.84	0.81	0.72	0.60				
155	1.00	0.99	0.98	0.96	0.94	0.92	0.91	0.92	0.93	0.94	0.96	0.95	0.91	0.81	0.66				
160	0.89	0.91	0.93	0.95	0.96	0.96	0.97	0.99	1.01	1.03	1.05	1.05	1.01	0.90	0.73				
165	0.79	0.83	0.88	0.93	0.95	0.97	0.98	1.00	1.01	1.03	1.06	1.08	1.06	0.95	0.79				
170	0.69	0.72	0.75	0.78	0.79	0.80	0.81	0.86	0.90	0.94	0.98	0.99	0.98	0.90	0.78				
175	0.62	0.63	0.65	0.67	0.68	0.70	0.72	0.77	0.82	0.86	0.89	0.90	0.89	0.84	0.77				
180	0.58	0.58	0.60	0.61	0.63	0.64	0.66	0.67	0.68	0.69	0.70	0.70	0.70	0.70	0.71				

4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	WPX1 @ 15W / 4000K	Sample ID	231101002-S1
Temperature (°C)	25.4	Humidity (%RH)	41.0

Test Method
<p>The samples were tested according to the ANSI C82.77:2014</p> <p>The total harmonic distortion shall be measured to the 40th order.</p> <p>The ambient temperature shall be maintained at 25±1°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 was calculated.</p>

Test Results

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	iTHD(%)
120.0	60	0.141	16.7	0.989	5.05
277.0	60	0.078	17.7	0.816	20.56

5.0 Equipment List:

Equipment ID	Equipment Name	Last Cal.	Due Cal.
NTC-F01-001	Goniophotometer System	2022-11-09	2023-11-08
NTC-F01-006	2.0 meter Integrating Sphere	2022-11-09	2023-11-08
NTC-F01-012	Standard Lamp	2022-11-09	2023-11-08
NTC-F01-013	Standard Lamp	2022-11-09	2023-11-08
NTC-F01-031	Digital Power Meter	2023-08-25	2024-08-24
NTC-F01-019	Temperature & Humidity Meter	2022-11-12	2023-11-11

*****End of Report*****