

## 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.**

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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		4739
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		146.3
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	300		4661
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	Standard	Premium	143.9
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		32.4
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2014	20.00%	120V	2.82
			277V	9.29
Power Factor (THD & PF – Section 4.3)	ANSI C82.77:2014	0.9	120V	0.997
			277V	0.935
Allowable CCTs* (K) (Integrating Sphere – Section 4.1)	IES LM-79-2008	7 steps	3985±275	3920
		4 steps	3985±154	
Minimum CRI (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	≥70		83.8
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		0.125
(Goniophotometer – Section 4.2)		Non-Worst Case		0.265
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		32.4
(Goniophotometer – Section 4.2)		Non-Worst Case		31.7

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023-11-02	WPX1 @ 25W / 4000K	231101002-S1
2	Goniophotometer Test	2023-11-02	WPX1 @ 25W / 4000K	231101002-S1
3	THD and PF Test	2023-11-02	WPX1 @ 25W / 4000K	231101002-S1

### Remark (If any)

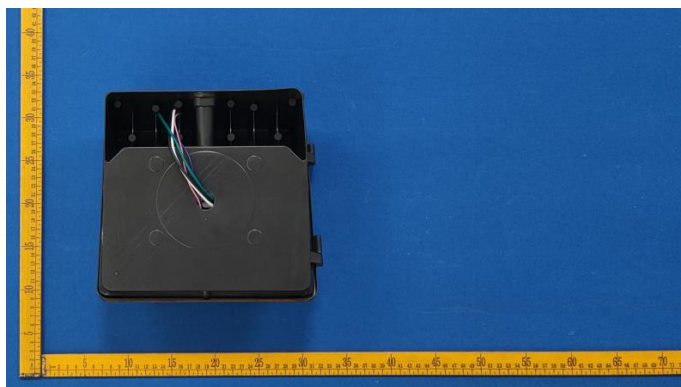
1. The results contained in this report pertain only to the tested samples.
2. This report shall not be reproduced, no limited part or full, without approval of Dongguan New Testing Centre Co., Ltd.
3. This report does not imply product certification, approval, or endorsement by NVLAP, or any agency of the Federal Government.

## 3.0 Product Description

Luminaire Description: Model No. WPX1 @ 25W / 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

<b>Model No.</b>	WPX1 @ 25W / 4000K	<b>Sample ID</b>	231101002-S1
<b>Operate time (Min.)</b>	10	<b>Stabilization time (Min.)</b>	60
<b>Temperature (°C)</b>	25.4	<b>Humidity (%RH)</b>	41.0

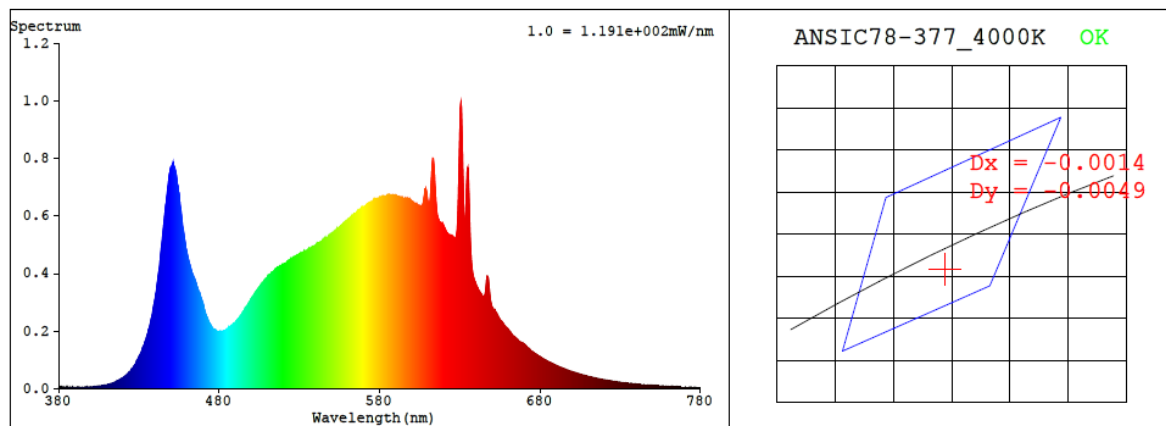
<b>Test Method</b>
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were made 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 4<math>\pi</math> geometry and operated at rated voltage and was stabilized before measurement.</p> <p>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	0.265	31.7	0.997
277.0	60	0.125	32.4	0.935

CCT (K)	CRI	R9	Duv	Rf	Rg	IES Rcs,h1
3920	83.8	15	-0.0019	84	96	-12%

## 4.1 Integrating Sphere Test



### Colorimetric Parameters

Chromaticity Coordinate:  $x = 0.3826$   $y = 0.3741$  /  $u' = 0.2276$   $v' = 0.5007$  ( $duv = -1.87e-03$ )

CCT= 3920K Prep WL:  $L_d = 580.4nm$  Purity=27.1%

Peak WL:  $L_p = 631nm$  FWHM: =101.1nm Ratio: R=18.9% G=77.5% B=3.6%

Render Index:  $R_a = 83.8$  AvgR = 77.7 TM30: Rf=84 Rg=96

EEL: 0.09417 A++ Highest

R1 =83 R2 =90 R3 =95 R4 =82 R5 =82 R6 =86 R7 =86

R8 =66 R9 =15 R10=76 R11=81 R12=64 R13=84 R14=97 R15=77

## 4.1 Integrating Sphere Test

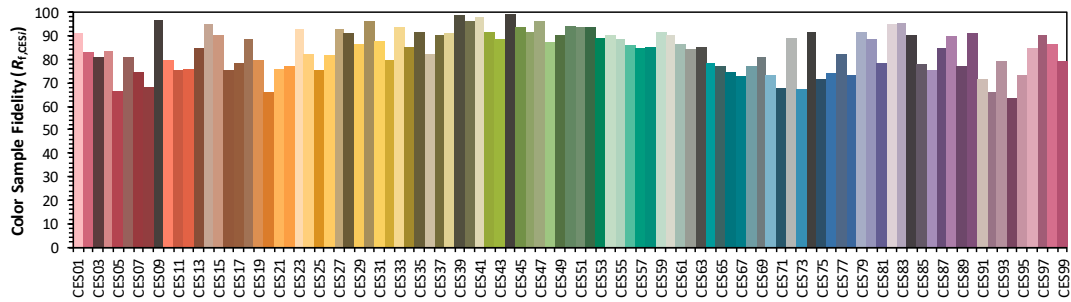
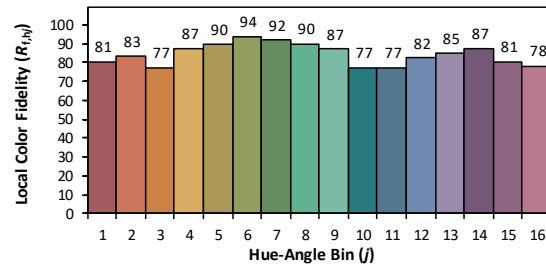
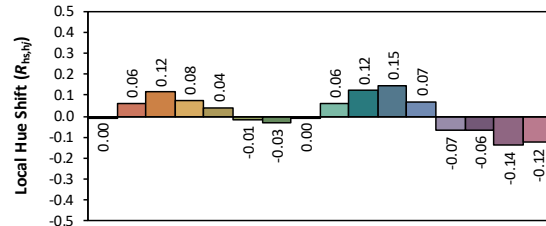
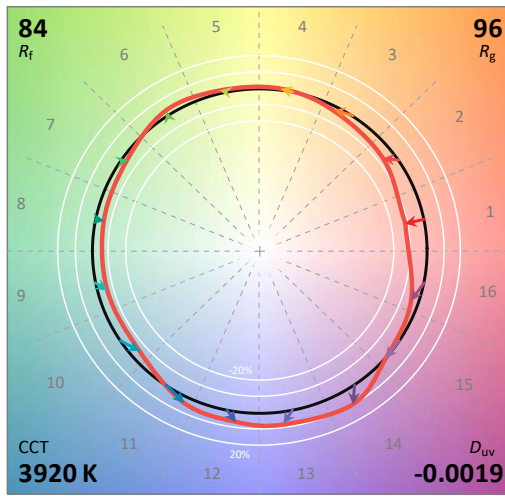
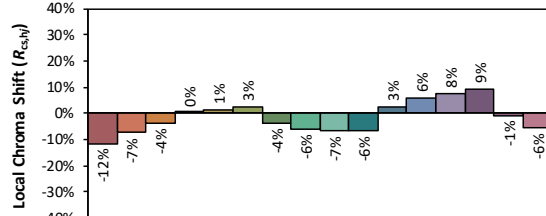
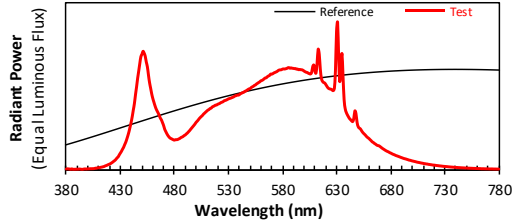
### ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2023/11/15

Model: WPX1 @ 25W / 4000K



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

$x$  0.3826  
 $y$  0.3740  
 $u'$  0.2276  
 $v'$  0.5007

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	5.10E-06	447	6.52E-04	514	4.07E-04	581	6.66E-04	648	3.70E-04	715	3.61E-05
381	6.70E-06	448	7.02E-04	515	4.15E-04	582	6.65E-04	649	3.13E-04	716	3.53E-05
382	5.90E-06	449	7.47E-04	516	4.18E-04	583	6.67E-04	650	2.86E-04	717	3.41E-05
383	5.20E-06	450	7.63E-04	517	4.22E-04	584	6.69E-04	651	2.76E-04	718	3.30E-05
384	3.10E-06	451	7.82E-04	518	4.27E-04	585	6.73E-04	652	2.71E-04	719	3.16E-05
385	6.40E-06	452	7.70E-04	519	4.28E-04	586	6.74E-04	653	2.60E-04	720	3.11E-05
386	3.50E-06	453	7.50E-04	520	4.32E-04	587	6.70E-04	654	2.49E-04	721	3.02E-05
387	3.60E-06	454	7.11E-04	521	4.35E-04	588	6.73E-04	655	2.41E-04	722	2.89E-05
388	3.60E-06	455	6.80E-04	522	4.39E-04	589	6.70E-04	656	2.34E-04	723	2.81E-05
389	4.00E-06	456	6.26E-04	523	4.43E-04	590	6.70E-04	657	2.26E-04	724	2.73E-05
390	4.00E-06	457	5.76E-04	524	4.46E-04	591	6.68E-04	658	2.18E-04	725	2.62E-05
391	4.10E-06	458	5.39E-04	525	4.49E-04	592	6.68E-04	659	2.12E-04	726	2.54E-05
392	5.30E-06	459	5.02E-04	526	4.56E-04	593	6.64E-04	660	2.07E-04	727	2.47E-05
393	4.40E-06	460	4.71E-04	527	4.58E-04	594	6.65E-04	661	1.99E-04	728	2.37E-05
394	3.50E-06	461	4.47E-04	528	4.60E-04	595	6.61E-04	662	1.93E-04	729	2.29E-05
395	3.10E-06	462	4.24E-04	529	4.64E-04	596	6.62E-04	663	1.85E-04	730	2.23E-05
396	4.60E-06	463	4.04E-04	530	4.68E-04	597	6.61E-04	664	1.81E-04	731	2.16E-05
397	5.70E-06	464	3.89E-04	531	4.71E-04	598	6.60E-04	665	1.74E-04	732	2.11E-05
398	5.50E-06	465	3.75E-04	532	4.73E-04	599	6.57E-04	666	1.70E-04	733	2.04E-05
399	5.30E-06	466	3.58E-04	533	4.76E-04	600	6.52E-04	667	1.64E-04	734	1.95E-05
400	6.30E-06	467	3.41E-04	534	4.79E-04	601	6.47E-04	668	1.61E-04	735	1.89E-05
401	6.10E-06	468	3.29E-04	535	4.82E-04	602	6.44E-04	669	1.59E-04	736	1.82E-05
402	7.30E-06	469	3.11E-04	536	4.87E-04	603	6.42E-04	670	1.55E-04	737	1.78E-05
403	7.00E-06	470	2.93E-04	537	4.89E-04	604	6.37E-04	671	1.49E-04	738	1.71E-05
404	7.40E-06	471	2.68E-04	538	4.93E-04	605	6.34E-04	672	1.44E-04	739	1.68E-05
405	7.60E-06	472	2.53E-04	539	4.93E-04	606	6.33E-04	673	1.39E-04	740	1.61E-05
406	8.50E-06	473	2.39E-04	540	4.95E-04	607	6.43E-04	674	1.34E-04	741	1.54E-05
407	1.07E-05	474	2.26E-04	541	5.02E-04	608	6.81E-04	675	1.29E-04	742	1.51E-05
408	1.12E-05	475	2.17E-04	542	5.05E-04	609	6.91E-04	676	1.25E-04	743	1.45E-05
409	1.27E-05	476	2.10E-04	543	5.09E-04	610	6.52E-04	677	1.22E-04	744	1.42E-05
410	1.34E-05	477	2.06E-04	544	5.11E-04	611	6.38E-04	678	1.19E-04	745	1.36E-05
411	1.51E-05	478	2.02E-04	545	5.17E-04	612	7.02E-04	679	1.14E-04	746	1.32E-05
412	1.67E-05	479	1.98E-04	546	5.20E-04	613	7.95E-04	680	1.11E-04	747	1.29E-05
413	1.82E-05	480	1.96E-04	547	5.25E-04	614	7.63E-04	681	1.07E-04	748	1.25E-05
414	2.01E-05	481	1.99E-04	548	5.29E-04	615	6.64E-04	682	1.03E-04	749	1.21E-05
415	2.20E-05	482	1.99E-04	549	5.34E-04	616	6.03E-04	683	1.01E-04	750	1.17E-05
416	2.57E-05	483	2.00E-04	550	5.35E-04	617	5.84E-04	684	9.75E-05	751	1.11E-05
417	2.82E-05	484	2.04E-04	551	5.42E-04	618	5.77E-04	685	9.40E-05	752	1.10E-05
418	3.14E-05	485	2.07E-04	552	5.47E-04	619	5.73E-04	686	9.17E-05	753	1.07E-05
419	3.48E-05	486	2.13E-04	553	5.51E-04	620	5.64E-04	687	8.91E-05	754	1.03E-05
420	3.77E-05	487	2.16E-04	554	5.57E-04	621	5.52E-04	688	8.63E-05	755	1.01E-05
421	4.14E-05	488	2.20E-04	555	5.60E-04	622	5.42E-04	689	8.35E-05	756	9.70E-06
422	4.62E-05	489	2.26E-04	556	5.67E-04	623	5.36E-04	690	8.07E-05	757	9.40E-06
423	5.13E-05	490	2.30E-04	557	5.71E-04	624	5.33E-04	691	7.82E-05	758	9.30E-06
424	5.71E-05	491	2.37E-04	558	5.76E-04	625	5.31E-04	692	7.54E-05	759	8.80E-06
425	6.24E-05	492	2.43E-04	559	5.81E-04	626	5.26E-04	693	7.34E-05	760	8.40E-06
426	7.00E-05	493	2.51E-04	560	5.87E-04	627	5.22E-04	694	7.16E-05	761	8.30E-06
427	7.90E-05	494	2.58E-04	561	5.90E-04	628	5.37E-04	695	6.92E-05	762	8.00E-06
428	8.59E-05	495	2.67E-04	562	5.94E-04	629	6.55E-04	696	6.70E-05	763	7.80E-06
429	9.88E-05	496	2.76E-04	563	6.00E-04	630	9.12E-04	697	6.43E-05	764	7.10E-06
430	1.10E-04	497	2.84E-04	564	6.06E-04	631	9.73E-04	698	6.30E-05	765	7.10E-06
431	1.22E-04	498	2.93E-04	565	6.07E-04	632	7.38E-04	699	6.08E-05	766	7.00E-06
432	1.36E-04	499	3.02E-04	566	6.14E-04	633	5.82E-04	700	5.87E-05	767	6.70E-06
433	1.49E-04	500	3.12E-04	567	6.19E-04	634	6.77E-04	701	5.71E-05	768	6.50E-06
434	1.66E-04	501	3.20E-04	568	6.23E-04	635	7.68E-04	702	5.53E-05	769	6.40E-06
435	1.82E-04	502	3.29E-04	569	6.32E-04	636	6.19E-04	703	5.37E-05	770	6.40E-06
436	2.04E-04	503	3.38E-04	570	6.32E-04	637	4.63E-04	704	5.16E-05	771	6.00E-06
437	2.27E-04	504	3.46E-04	571	6.34E-04	638	4.04E-04	705	4.99E-05	772	5.70E-06
438	2.52E-04	505	3.53E-04	572	6.39E-04	639	3.79E-04	706	4.87E-05	773	5.80E-06
439	2.83E-04	506	3.59E-04	573	6.42E-04	640	3.63E-04	707	4.72E-05	774	5.80E-06
440	3.15E-04	507	3.68E-04	574	6.46E-04	641	3.50E-04	708	4.54E-05	775	5.40E-06
441	3.52E-04	508	3.74E-04	575	6.49E-04	642	3.38E-04	709	4.41E-05	776	5.10E-06
442	3.95E-04	509	3.81E-04	576	6.55E-04	643	3.31E-04	710	4.28E-05	777	5.20E-06
443	4.38E-04	510	3.88E-04	577	6.59E-04	644	3.23E-04	711	4.10E-05	778	4.90E-06
444	4.95E-04	511	3.94E-04	578	6.60E-04	645	3.19E-04	712	4.02E-05	779	4.90E-06
445	5.48E-04	512	3.98E-04	579	6.61E-04	646	3.40E-04	713	3.86E-05	780	4.90E-06
446	6.04E-04	513	4.05E-04	580	6.64E-04	647	3.89E-04	714	3.79E-05	N/A	N/A



## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

<b>Model No.</b>	WPX1 @ 25W / 4000K	<b>Sample ID</b>	231101002-S1
<b>Operate time (Min.)</b>	30	<b>Stabilization time (Min.)</b>	60
<b>Temperature (°C)</b>	24.8	<b>Humidity (%RH)</b>	42.9

<b>Test Method</b>
<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 <math>25 \pm 1^{\circ}\text{C}</math>, 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 <math>\pm 0.2</math> 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 <math>1.0^{\circ}</math> vertical intervals and <math>15^{\circ}</math> horizontal intervals.</p>

#### Test Conditions

Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
<b>WORST CASE</b>	277.0	60	0.125	32.4	0.935
<b>NON-WORST CASE</b>	120.0	60	0.265	31.7	0.997

#### Test Result

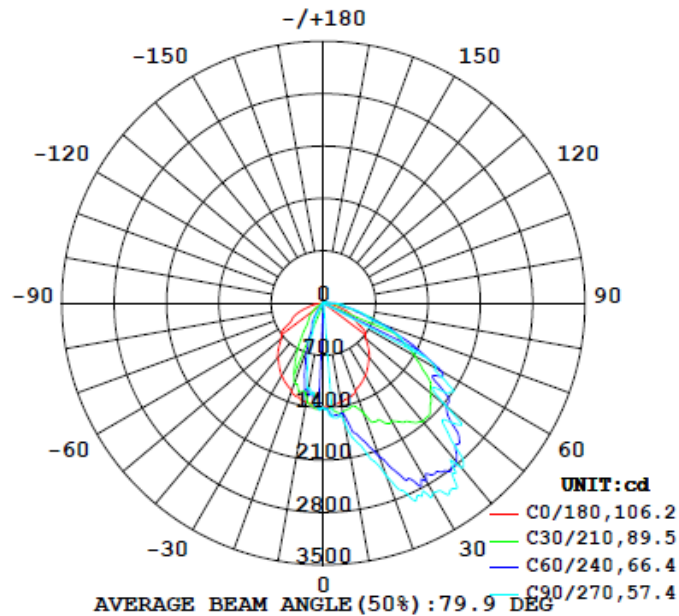
Result Type	Flux (lm)	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)	Zonal Lumen Requirement (80°-90°)	BUG
		C0-180	C90-270	C0-180	C90-270			
<b>0°-180° zones</b>	4739	109.1	146.7	56.2	96.5	146.3	2.1%	B1-U2-G1
<b>0°-90° zones</b>	4661	109.1	146.7	56.2	96.5	143.9	2.1%	B1-U2-G1



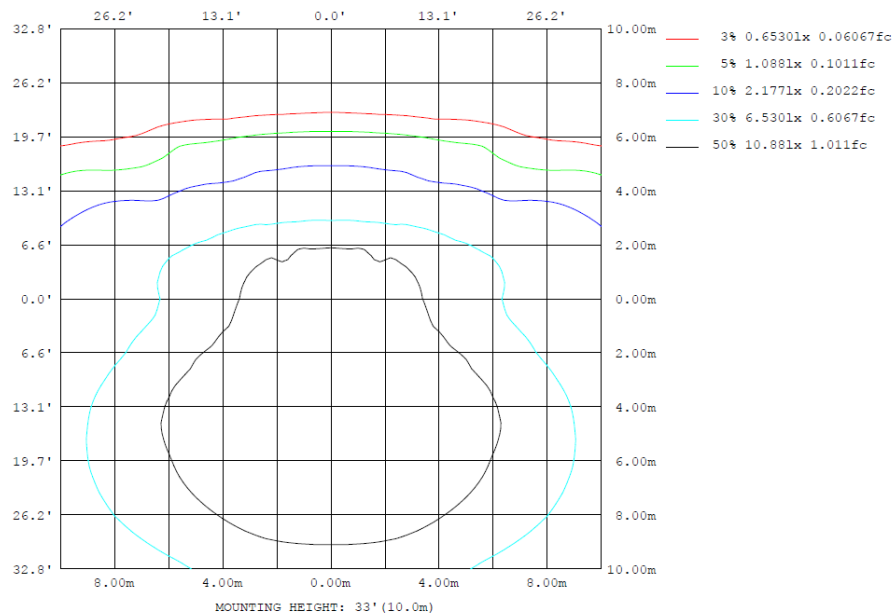
## 4.2 Goniophotometer Test

### Lighting Distribution Curve

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM



### Isolux Plot



## 4.2 Goniophotometer Test

### Zonal Lumen Summary

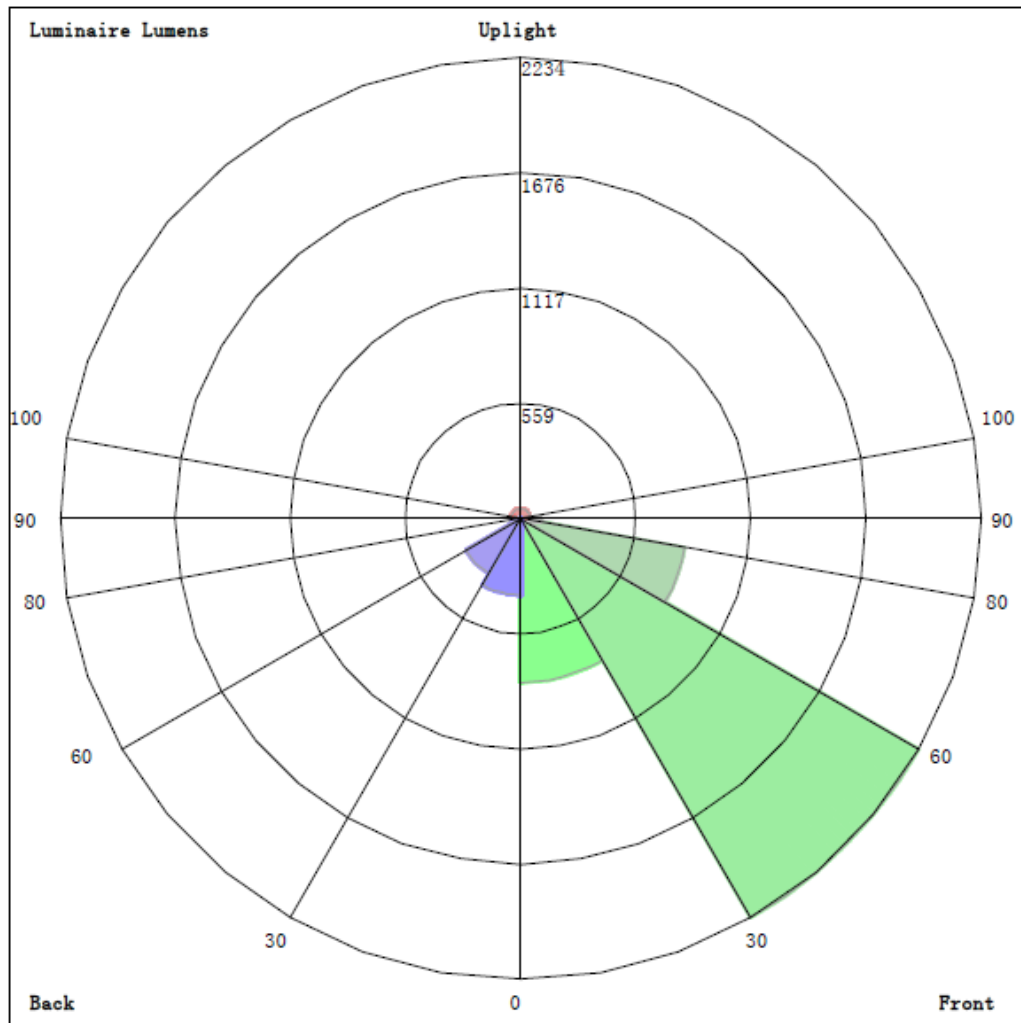
ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	± zone	± total	%lum, lamp
10	1339	1517	1622	1517	1339	1207	1169	1207	0- 10	133.1	133.1	2.81, 2.81
20	1255	1901	2453	1901	1255	841.3	447.7	841.3	10- 20	390.2	523.3	11, 11
30	1126	2412	2928	2412	1126	362.4	221.6	362.4	20- 30	641.1	1164	24.6, 24.6
40	955.0	2411	2875	2411	955.0	199.3	64.71	199.3	30- 40	838.2	2002	42.3, 42.3
50	740.8	2161	2123	2161	740.8	67.59	29.79	67.59	40- 50	896.5	2899	61.2, 61.2
60	516.4	1568	1742	1568	516.4	25.75	0.6027	25.75	50- 60	805.7	3705	78.2, 78.2
70	346.8	899.8	754.8	899.8	346.8	4.578	0.8733	4.578	60- 70	584.3	4289	90.5, 90.5
80	120.8	300.0	316.3	300.0	120.8	2.034	0.8912	2.034	70- 80	272.9	4562	96.3, 96.3
90	16.13	114.6	104.5	114.6	16.13	1.347	1.064	1.347	80- 90	99.61	4661	98.4, 98.4
100	11.13	36.73	56.28	36.73	11.13	1.466	1.460	1.466	90-100	30.61	4692	99, 99
110	10.44	11.79	41.82	11.79	10.44	1.333	1.522	1.333	100-110	14.25	4706	99.3, 99.3
120	8.321	28.29	15.30	28.29	8.321	1.274	1.604	1.274	110-120	10.07	4716	99.5, 99.5
130	3.360	22.53	25.23	22.53	3.360	1.372	1.917	1.372	120-130	10.50	4727	99.7, 99.7
140	0.8806	13.76	20.15	13.76	0.8806	1.517	1.992	1.517	130-140	7.010	4734	99.9, 99.9
150	0.8092	6.746	9.571	6.746	0.8092	1.692	1.937	1.692	140-150	3.542	4737	100, 100
160	0.9492	0.7542	3.254	0.7542	0.9492	1.793	1.723	1.793	150-160	1.197	4739	100, 100
170	1.146	1.109	0.9038	1.109	1.146	1.503	1.313	1.503	160-170	0.3959	4739	100, 100
180	1.320	1.272	1.073	1.272	1.320	1.218	1.143	1.218	170-180	0.1218	4739	100, 100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

	Zonal (lm)		Total (lm)	Percent
0-10	133.08	0-10	133.08	2.81%
10-20	390.19	0-20	523.27	11.04%
20-30	641.07	0-30	1164.34	24.57%
30-40	838.15	0-40	2002.49	42.26%
40-50	896.48	0-50	2898.97	61.17%
50-60	805.68	0-60	3704.65	78.17%
60-70	584.33	0-70	4288.98	90.50%
70-80	272.88	0-80	4561.86	96.26%
80-90	99.61	0-90	4661.47	98.36%
90-100	30.61	0-100	4692.08	99.01%
100-110	14.25	0-110	4706.33	99.31%
110-120	10.07	0-120	4716.40	99.52%
120-130	10.50	0-130	4726.90	99.74%
130-140	7.01	0-140	4733.91	99.89%
140-150	3.54	0-150	4737.45	99.97%
150-160	1.20	0-160	4738.65	99.99%
160-170	0.40	0-170	4739.05	100.00%
170-180	0.12	0-180	4739.17	100.00%

## 4.2 Goniophotometer Test

LCS/BUG

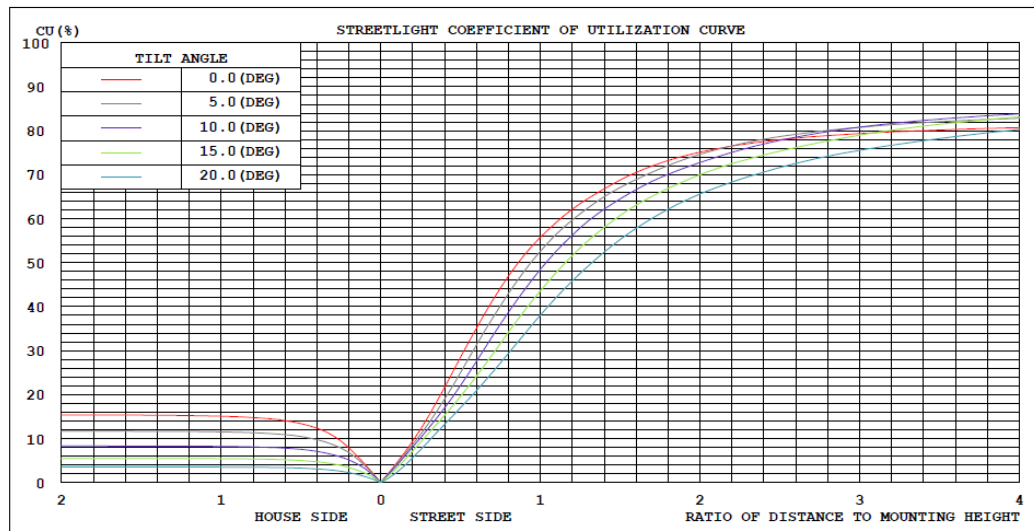


### LUMINAIRE CLASSIFICATION SYSTEM (LCS)

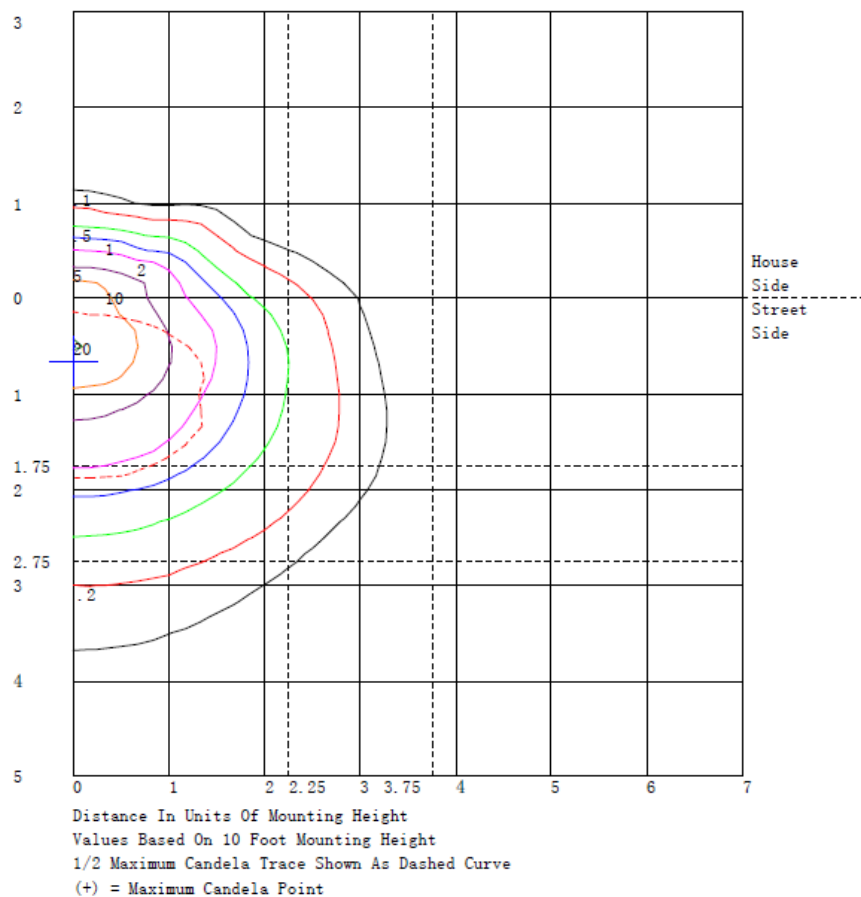
	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	793.5	N.A.	16.7
FM - Front-Medium (30-60)	2234.0	N.A.	47.1
FH - Front-High (60-80)	808.1	N.A.	17.1
FVH - Front-Very High (80-90)	94.9	N.A.	2.0
BL - Back-Low (0-30)	370.8	N.A.	7.8
BM - Back-Medium (30-60)	306.3	N.A.	6.5
BH - Back-High (60-80)	49.1	N.A.	1.0
BVH - Back-Very High (80-90)	4.7	N.A.	0.1
UL - Uplight-Low (90-100)	30.6	N.A.	0.6
UH - Uplight-High (100-180)	47.1	N.A.	1.0
<b>Total</b>	<b>4739.1</b>	<b>N.A.</b>	<b>100.0</b>
<b>BUG Rating</b>	<b>B1-U2-G1</b>		

## 4.2 Goniophotometer Test

### Coefficients of Utilization



### Isolines



## 4.2 Goniophotometer Test

### Luminous Distribution Intensity Data

Table--1 UNIT: cd

C (DEG) γ (DEG)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	1400	1399	1399	1400	1400	1400	1401	1402	1402	1403	1402	1402	1402	1402	1403	1403	1403	1403	1403
5	1373	1384	1394	1403	1410	1418	1428	1448	1469	1489	1501	1511	1516	1516	1515	1515	1523	1532	1539
10	1339	1353	1371	1392	1422	1452	1479	1498	1511	1517	1508	1498	1494	1516	1545	1576	1597	1613	1622
15	1296	1343	1380	1408	1412	1416	1432	1494	1571	1653	1723	1790	1850	1905	1950	1983	1995	1997	1990
20	1255	1285	1323	1369	1419	1481	1557	1665	1783	1901	2005	2101	2187	2258	2318	2367	2411	2440	2453
25	1188	1200	1243	1316	1431	1568	1718	1862	2009	2159	2321	2477	2616	2714	2790	2846	2889	2915	2924
30	1126	1136	1189	1285	1439	1622	1824	2029	2229	2412	2548	2659	2748	2818	2870	2906	2923	2929	2928
35	1037	1107	1209	1342	1524	1725	1932	2121	2298	2456	2574	2673	2760	2853	2935	2998	3025	3033	3026
40	955	1047	1176	1343	1582	1832	2067	2205	2315	2411	2547	2668	2761	2762	2742	2721	2775	2832	2875
45	850	974	1126	1306	1544	1789	2016	2165	2281	2372	2468	2537	2569	2516	2436	2350	2300	2266	2251
50	741	875	1032	1211	1442	1673	1882	2014	2105	2161	2162	2151	2145	2223	2302	2356	2384	2196	2123
55	688	883	1067	1240	1414	1567	1693	1757	1792	1809	1816	1821	1833	1885	1944	2000	2035	2058	2068
60	516	719	900	1060	1199	1317	1413	1473	1521	1568	1665	1755	1821	1795	1747	1698	1707	1725	1742
65	447	609	751	875	973	1055	1127	1204	1269	1317	1332	1328	1308	1269	1224	1182	1162	1152	1150
70	347	414	489	571	676	776	860	933	904	900	891	875	857	846	833	819	797	774	755
75	220	273	326	378	439	494	533	531	516	496	492	491	495	507	521	535	543	548	549
80	121	158	190	218	242	261	277	288	295	300	302	303	303	303	304	306	310	314	316
85	44.2	59.6	75.7	92.7	112	130	148	161	174	185	199	213	225	233	239	244	248	251	251
90	16.1	23.7	33.1	44.5	59.7	75.3	90.1	101	109	115	115	112	109	107	105	103	103	104	104
95	11.9	18.4	24.9	31.6	39.5	46.7	52.4	53.5	53.0	52.0	52.3	53.0	54.2	56.7	59.6	62.5	65.1	67.1	68.2
100	11.1	11.9	12.7	13.6	13.7	14.6	16.6	22.9	30.0	36.7	39.7	41.8	43.4	46.1	48.9	51.4	53.7	55.4	56.3
105	1.97	5.80	8.83	11.1	12.0	12.5	13.0	14.7	16.8	19.1	21.6	24.2	26.8	29.2	31.5	33.7	36.1	38.1	39.3
110	10.4	9.07	9.14	10.7	15.6	20.5	24.0	19.9	15.2	11.8	16.8	23.8	31.0	34.5	37.1	38.8	40.3	41.4	41.8
115	9.36	7.46	7.15	8.42	12.4	17.2	21.7	24.7	26.2	25.9	21.2	15.6	10.4	9.49	9.84	11.0	12.4	13.8	14.8
120	8.32	6.36	5.86	6.81	9.95	14.0	18.4	22.0	25.3	28.3	31.2	33.2	34.1	32.2	29.3	25.7	20.8	17.0	15.3
125	6.08	4.66	4.41	5.33	7.88	11.2	15.1	18.8	22.5	26.0	29.2	31.9	34.0	35.5	36.2	35.8	32.2	28.6	26.3
130	3.36	2.60	2.73	3.76	5.99	8.88	12.2	15.6	19.1	22.5	26.1	29.4	31.9	33.0	33.2	32.5	29.7	27.0	25.2
135	1.14	0.00	0.00	0.59	3.15	6.41	9.98	12.9	15.8	18.7	22.3	25.7	28.4	29.2	29.1	28.3	26.5	24.7	23.7
140	0.88	2.19	3.45	4.65	5.65	6.71	7.94	9.58	11.5	13.8	16.9	19.9	22.4	23.2	23.4	22.9	21.8	20.8	20.2
145	0.82	1.49	2.22	3.01	3.80	4.68	5.69	6.90	8.28	9.82	11.9	13.8	15.4	15.9	15.9	15.6	15.1	14.6	14.3
150	0.81	1.27	1.53	1.59	1.02	0.59	0.61	2.39	4.57	6.75	7.95	8.81	9.39	9.71	9.85	9.85	9.75	9.63	9.57
155	0.86	0.85	0.86	0.90	0.83	0.88	1.11	1.91	2.84	3.77	4.36	4.82	5.16	5.36	5.49	5.55	5.63	5.69	5.74
160	0.95	0.94	0.93	0.92	0.90	0.87	0.85	0.74	0.68	0.75	1.20	1.75	2.29	2.63	2.89	3.08	3.18	3.23	3.25
165	1.04	1.05	1.05	1.05	1.03	1.00	0.98	0.94	0.92	0.92	0.98	1.05	1.10	1.04	0.95	0.86	0.82	0.80	0.80
170	1.15	1.16	1.17	1.18	1.18	1.18	1.17	1.15	1.13	1.11	1.09	1.08	1.06	1.05	1.04	1.02	0.97	0.93	0.90
175	1.23	1.24	1.24	1.24	1.25	1.25	1.25	1.25	1.24	1.23	1.22	1.21	1.19	1.14	1.08	1.03	1.00	0.98	0.98
180	1.32	1.33	1.33	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.25	1.23	1.20	1.18	1.17	1.15	1.12	1.09	1.07

UNIT: cd																			
C (DEG) γ (DEG)	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	1403	1403	1403	1403	1402	1402	1402	1402	1403	1402	1402	1401	1400	1400	1400	1399	1399	1400	1399
5	1532	1523	1515	1515	1516	1516	1511	1501	1489	1469	1448	1428	1418	1410	1403	1394	1384	1373	1387
10	1613	1597	1576	1545	1516	1494	1498	1508	1517	1511	1498	1479	1452	1422	1392	1371	1353	1339	1360
15	1997	1995	1983	1950	1905	1850	1790	1723	1653	1571	1494	1432	1416	1412	1408	1380	1343	1296	1312
20	2440	2411	2367	2318	2258	2187	2101	2005	1901	1783	1665	1557	1481	1419	1369	1323	1285	1255	1240
25	2915	2889	2846	2790	2714	2616	2477	2321	2159	2009	1862	1718	1568	1431	1316	1243	1200	1188	1184
30	2929	2923	2906	2870	2818	2748	2659	2548	2412	2229	2029	1824	1622	1439	1285	1189	1136	1126	1151
35	3033	3025	2998	2935	2853	2760	2673	2574	2456	2298	2121	1932	1725	1524	1342	1209	1107	1037	1072
40	2832	2775	2721	2742	2762	2761	2668	2547	2411	2315	2205	2067	1832	1582	1343	1176	1047	955	995
45	2266	2300	2350	2436	2516	2569	2537	2468	2372	2281	2165	2016	1789	1544	1306	1126	974	850	824
50	2196	2284	2356	2302	2223	2145	2151	2162	2161	2015	2014	1882	1673	1442	1211	1032	875	741	660
55	2058	2035	2000	1944	1885	1833	1821	1816	1809	1792	1757	1693	1567	1414	1240	1067	883	688	541
60	1725	1707	1698	1747	1795	1821	1755	1665	1568	1521	1473	1413	1317	1199	1060	900	719	516	382
65	1152	1162	1182	1224	1269	1308	1328	1332	1317	1269	1204	1127	1055	973	875	751	609	447	316
70	774	797	819	833	846	857	875	891	900	904	893	860	776	676	571	489	414	347	245
75	548	543	535	521	507	495	491	492	496	516	531	533	494	439	378	326	273	220	155
80	314	310	306	304	303	303	303	302	300	295	288	277	261	242	218	190	158	121	84.0
85	251	248	244	239	233	225	213	199	185	174	161	148	130	112	92.7	75.7	59.6	44.2	33.0
90	104	103	103	105	107	109	112	115	115	109	101	90.1	75.3	59.7	44.5	33.1	23.7	16.1	13.3
95	67.1	65.1	62.5	59.6	56.7	54.2	53.0	52.3	52.0	53.0	53.5	52.4	46.7	39.5	31.6	24.9	18.4	11.9	9.67
100	55.4	53.7	51.4	48.9	46.1	43.4	41.8	39.7	36.7	30.0	22.9	16.6	14.6	13.7	13.6	12.7	11.9	11.1	8.69
105	38.1	36.1	33.7	31.5	29.2	26.8	24.2	21.6	19.1	16.8	14.7	13.0	12.5	12.0	11.1	8.83	5.80	1.97	1.60
110	41.4	40.3	38.8	37.1	34.5	31.0	23.8	16.8	11.8	15.2	19.9	24.0	20.5	15.6	10.7	9.14	9.07	10.4	6.60
115	13.8	12.4	11.0	9.84	9.49	10.4	15.6	21.2	25.9	26.2	24.7	21.7	17.2	12.4	8.42	7.15	7.46	9.36	5.97
120	17.0	20.8	25.7	29.3	32.2	34.1	33.2	31.2	28.3	25.3	22.0	18.4	14.0	9.95	6.81	5.86	6.36	8.32	5.41
125	28.6	32.2	35.8	36.2	35.5	34.0	31.9	29.2	26.0	22.5	18.8	15.1	11.2	7.88	5.33	4.41	4.66	6.08	4.21
130	27.0	29.7	32.5	33.2	33.0	31.9	29.4	26.1	22.5	19.1	15.6	12.2	8.88	5.99	3.76	2.73	2.60	3.36	2.59
135	24.7	26.5	28.3	29.1	29.2	28.4	25.7	22.3	18.7	15.8	12.9	9.98	6.41	3.15	0.59	0.00	1.00	1.14	1.34
140	20.8	21.8	22.9	23.4	23.2	22.4	19.9	16.9	13.8	11.5	9.58	7.94	6.71	5.65	4.65	3.45	2.19	0.88	1.11
145	14.6	15.1	15.6	15.9	15.9	15.4	13.8	11.9	9.82	8.28	6.90	5.69	4.68	3.80	3.01	2.22	1.49	0.82	1.08
150	9.63	9.75	9.85	9.85	9.71	9.39	8.81	7.95	6.75	5.47	2.39	0.61	0.59	1.02	1.59	1.53	1.27	0.81	1.10
155	5.69	5.63	5.55	5.49	5.36	5.16	4.82	4.36	3.77	2.84	1.91	1.11	0.88	0.83	0.90	0.86	0.85	0.86	1.22
160	3.23	3.18	3.08	2.89	2.63	2.29	1.75	1.20	0.75	0.68	0.74	0.85	0.87	0.90	0.92	0.93	0.94	0.95	1.36
165	0.80	0.82	0.86	0.95	1.04	1.10	1.05	0.98	0.92	0.92	0.94	0.98	1.00	1.03	1.05	1.05	1.04	1.04	1.45
170	0.93	0.97	1.02	1.04	1.05	1.06	1.08	1.09	1.11	1.13	1.15	1.17	1.18	1.18	1.18	1.17	1.16	1.15	1.45
175	0.98	1.00	1.03	1.08	1.14	1.19	1.21	1.22	1.23	1.24	1.25	1.25	1.25	1.25	1.24	1.24	1.24	1.23	1.42
180	1.09	1.12	1.15	1.17	1.18	1.20	1.23	1.25	1.27	1.28	1.29	1.30	1.31	1.32	1.33	1.33	1.33	1.32	1.41



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	1399	1399	1399	1399	1399	1400	1401	1402	1402	1402	1401	1402	1403	1403	1403	1403	1403	1403
5	1397	1405	1412	1414	1412	1397	1380	1366	1371	1378	1384	1373	1358	1344	1339	1337	1337	1337	1339
10	1370	1367	1349	1323	1293	1262	1232	1207	1195	1188	1182	1173	1164	1159	1161	1165	1169	1165	1161
15	1318	1313	1295	1269	1238	1211	1179	1142	1091	1037	983	935	893	860	840	830	827	830	840
20	1222	1202	1188	1165	1125	1040	942	841	760	688	626	581	546	517	484	460	448	460	484
25	1163	1125	1068	995	908	798	685	577	493	424	373	349	337	334	328	324	322	324	328
30	1137	1081	963	822	674	552	447	362	323	303	293	275	259	245	234	226	222	226	234
35	1055	985	821	636	458	376	323	288	248	214	186	160	139	124	115	111	111	111	115
40	977	901	717	512	321	252	216	199	159	123	93.3	77.9	69.2	65.5	63.5	63.5	64.7	63.5	63.5
45	770	687	549	402	266	195	147	116	87.5	67.7	55.2	49.5	48.0	48.7	47.4	46.5	46.1	46.5	47.4
50	576	489	390	294	207	146	100	67.6	48.9	39.1	35.2	31.5	30.0	29.8	29.5	29.6	29.8	29.6	29.5
55	417	315	243	188	145	103	68.3	42.2	28.9	22.2	20.0	17.6	16.8	16.9	16.6	16.6	16.7	16.6	16.6
60	273	190	143	114	95.6	68.2	44.6	25.7	15.8	10.2	7.42	4.47	2.64	1.62	0.92	0.63	0.60	0.63	0.92
65	212	133	90.5	66.4	53.7	35.7	21.7	11.4	5.33	2.04	0.73	0.14	0.35	0.93	0.89	0.81	0.71	0.81	0.89
70	162	100	64.9	44.4	33.3	20.1	10.7	4.58	1.58	0.57	0.78	0.62	0.74	0.98	0.98	0.94	0.87	0.94	0.98
75	102	62.4	39.9	26.9	20.0	12.0	6.44	2.93	1.19	0.65	0.83	0.77	0.86	1.01	0.99	0.95	0.88	0.95	0.99
80	54.5	32.5	20.5	14.0	10.9	6.74	3.87	2.03	1.12	0.81	0.89	0.84	0.88	0.96	0.95	0.93	0.89	0.93	0.95
85	23.8	16.5	11.8	8.55	6.34	4.19	2.60	1.51	1.01	0.84	0.88	0.86	0.89	0.94	0.95	0.95	0.93	0.95	0.95
90	10.9	8.76	7.04	5.59	4.35	3.13	2.11	1.35	1.05	0.97	1.01	0.98	0.99	1.01	1.02	1.04	1.06	1.04	1.02
95	7.74	6.16	5.04	4.17	3.46	2.65	1.95	1.40	1.20	1.14	1.16	1.13	1.12	1.12	1.14	1.18	1.22	1.18	1.14
100	6.68	5.08	4.06	3.36	2.86	2.28	1.81	1.47	1.34	1.30	1.33	1.32	1.32	1.33	1.36	1.40	1.46	1.40	1.36
105	1.32	1.15	1.12	1.16	1.24	1.30	1.36	1.41	1.42	1.41	1.41	1.42	1.44	1.46	1.50	1.54	1.57	1.54	1.50
110	3.72	1.81	1.33	1.46	1.88	1.70	1.50	1.33	1.33	1.37	1.44	1.46	1.49	1.50	1.51	1.52	1.52	1.52	1.51
115	3.41	1.68	1.15	1.18	1.48	1.40	1.32	1.28	1.31	1.36	1.42	1.44	1.46	1.48	1.51	1.53	1.54	1.53	1.51
120	3.19	1.66	1.11	1.04	1.24	1.22	1.23	1.27	1.33	1.39	1.44	1.48	1.51	1.53	1.57	1.59	1.60	1.59	1.57
125	2.76	1.73	1.28	1.13	1.17	1.17	1.22	1.31	1.39	1.47	1.55	1.60	1.63	1.66	1.70	1.73	1.75	1.73	1.70
130	1.99	1.55	1.32	1.22	1.20	1.22	1.29	1.37	1.44	1.52	1.60	1.68	1.75	1.82	1.87	1.90	1.92	1.90	1.87
135	1.47	1.52	1.46	1.36	1.27	1.30	1.36	1.44	1.52	1.60	1.69	1.76	1.82	1.88	1.92	1.95	1.96	1.95	1.92
140	1.29	1.40	1.41	1.39	1.37	1.40	1.46	1.52	1.57	1.63	1.69	1.76	1.84	1.90	1.94	1.97	1.99	1.97	1.94
145	1.27	1.41	1.46	1.47	1.47	1.51	1.55	1.60	1.67	1.73	1.80	1.85	1.89	1.92	1.96	1.98	2.00	1.98	1.96
150	1.33	1.49	1.55	1.57	1.56	1.60	1.65	1.69	1.73	1.76	1.80	1.82	1.85	1.87	1.90	1.92	1.94	1.92	1.90
155	1.50	1.69	1.76	1.77	1.74	1.72	1.69	1.68	1.70	1.74	1.78	1.81	1.83	1.85	1.84	1.83	1.82	1.83	1.84
160	1.66	1.87	1.94	1.94	1.90	1.87	1.83	1.79	1.78	1.77	1.76	1.72	1.68	1.65	1.67	1.70	1.72	1.70	1.67
165	1.75	1.95	1.99	1.96	1.90	1.87	1.84	1.81	1.78	1.75	1.71	1.62	1.54	1.47	1.48	1.50	1.54	1.50	1.48
170	1.67	1.81	1.84	1.81	1.74	1.66	1.58	1.50	1.48	1.46	1.44	1.38	1.32	1.28	1.28	1.29	1.31	1.29	1.28
175	1.56	1.64	1.66	1.64	1.58	1.51	1.42	1.34	1.29	1.26	1.24	1.20	1.17	1.15	1.17	1.20	1.24	1.20	1.17
180	1.30	1.29	1.29	1.28	1.28	1.26	1.24	1.22	1.19	1.16	1.14	1.11	1.10	1.09	1.10	1.12	1.14	1.12	1.10

																UNIT: cd			
C (DEG)		285	290	295	300	305	310	315	320	325	330	335	340	345	350	355			
γ (DEG)	0	1403	1402	1402	1401	1402	1402	1402	1401	1400	1399	1399	1399	1399	1399	1399			
	5	1344	1358	1373	1384	1378	1371	1366	1380	1397	1412	1414	1412	1405	1397	1387			
10	1159	1164	1173	1182	1188	1195	1207	1232	1262	1293	1323	1349	1367	1370	1360				
15	860	893	935	983	1037	1091	1142	1179	1211	1238	1269	1295	1313	1318	1312				
20	517	546	581	626	688	760	841	942	1040	1125	1165	1188	1202	1222	1240				
25	334	337	349	373	424	493	577	685	798	908	995	1068	1125	1163	1184				
30	245	259	275	293	303	323	362	447	552	674	822	963	1081	1137	1151				
35	124	139	160	186	214	248	288	323	376	458	636	821	985	1055	1072				
40	65.5	69.2	77.9	93.3	123	159	199	216	252	321	512	717	901	977	995				
45	48.7	48.0	49.5	55.2	67.7	87.5	116	147	195	266	402	549	687	770	824				
50	29.8	30.0	31.5	35.2	39.1	48.9	67.6	100	146	207	294	390	489	576	660				
55	16.9	16.8	17.6	20.0	22.2	28.9	42.2	68.3	103	145	188	243	315	417	541				
60	1.62	2.64	4.47	7.42	10.2	15.8	25.7	44.6	68.2	95.6	114	143	190	273	382				
65	0.93	0.35	0.14	0.73	2.04	5.33	11.4	21.7	35.7	53.7	66.4	90.5	133	212	316				
70	0.98	0.74	0.62	0.78	0.57	1.58	4.58	10.7	20.1	33.3	44.4	64.9	100	162	245				
75	1.01	0.86	0.77	0.83	0.65	1.19	2.93	6.44	12.0	20.0	26.9	39.9	62.4	102	155				
80	0.96	0.88	0.84	0.89	0.81	1.12	2.03	3.87	6.74	10.9	14.0	20.5	32.5	54.5	84.0				
85	0.94	0.89	0.86	0.88	0.84	1.01	1.51	2.60	4.19	6.34	8.55	11.8	16.5	23.8	33.0				
90	1.01	0.99	0.98	1.01	0.97	1.05	1.35	2.11	3.13	4.35	5.59	7.04	8.76	10.9	13.3				
95	1.12	1.12	1.13	1.16	1.14	1.20	1.40	1.95	2.65	3.46	4.17	5.04	6.16	7.74	9.67				
100	1.33	1.32	1.32	1.33	1.30	1.34	1.47	1.81	2.28	2.86	3.36	4.06	5.08	6.68	8.69				
105	1.46	1.44	1.42	1.41	1.41	1.42	1.41	1.36	1.30	1.24	1.16	1.12	1.15	1.32	1.60				
110	1.50	1.49	1.46	1.44	1.37	1.33	1.33	1.50	1.70	1.88	1.46	1.33	1.81	3.72	6.60				
115	1.48	1.46	1.44	1.42	1.36	1.31	1.28	1.32	1.40	1.48	1.18	1.15	1.68	3.41	5.97				
120	1.53	1.51	1.48	1.44	1.39	1.33	1.27	1.23	1.22	1.24	1.04	1.11	1.66	3.19	5.41				
125	1.66	1.63	1.60	1.55	1.47	1.39	1.31	1.22	1.17	1.17	1.13	1.28	1.73	2.76	4.21				
130	1.82	1.75	1.68	1.60	1.52	1.44	1.37	1.29	1.22	1.20	1.22	1.32	1.55	1.99	2.59				
135	1.88	1.82	1.76	1.69	1.60	1.52	1.44	1.36	1.30	1.27	1.36	1.46	1.52	1.47	1.34				
140	1.90	1.84	1.76	1.69	1.63	1.57	1.52	1.46	1.40	1.37	1.39	1.41	1.40	1.29	1.11				
145	1.92	1.89	1.85	1.80	1.73	1.67	1.60	1.55	1.51	1.47	1.47	1.46	1.41	1.27	1.08				
150	1.87	1.85	1.82	1.80	1.76	1.73	1.69	1.65	1.60	1.56	1.57	1.55	1.49	1.33	1.10				
155	1.85	1.83	1.81	1.78	1.74	1.70	1.68	1.69	1.72	1.74	1.77	1.76	1.69	1.50	1.22				
160	1.65	1.68	1.72	1.76	1.77	1.78	1.79	1.83	1.87	1.90	1.94	1.94	1.87	1.66	1.36				
165	1.47	1.54	1.62	1.71	1.75	1.78	1.81	1.84	1.87	1.90	1.96	1.99	1.95	1.75	1.45				
170	1.28	1.32	1.38	1.44	1.46	1.48	1.50	1.58	1.66	1.74	1.81	1.84	1.81	1.67	1.45				
175	1.15	1.17	1.20	1.24	1.26	1.29	1.34	1.42	1.51	1.58	1.64	1.66	1.64	1.56	1.42				
180	1.03	1.10	1.11	1.14	1.16	1.19	1.22	1.24	1.26	1.28	1.28	1.29	1.29	1.30	1.31				

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

<b>Model No.</b>	WPX1 @ 25W / 4000K	<b>Sample ID</b>	231101002-S1
<b>Temperature (°C)</b>	25.4	<b>Humidity (%RH)</b>	41.0

<b>Test Method</b>
<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	0.265	31.7	0.997	2.82
277.0	60	0.125	32.4	0.935	9.29



## 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\*\*\*\*\*