

## 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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Issue Date: 2023-10-30

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		14082
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		137.0
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	300		13711
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	Standard	Premium	133.4
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		102.8
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2014	20.00%	480V	14.45
Power Factor (THD & PF – Section 4.3)	ANSI C82.77:2014	0.9	480V	0.875
Allowable CCTs* (K) (Integrating Sphere – Section 4.1)	IES LM-79-2008	7 steps	3045±175	3117
		4 steps	3045±100	
Minimum CRI (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	≥70		82.6
Minimum R9 (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	N/A		7
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		97
IES Rcs,h1 (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-11%
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		480.0
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A
Input Current (A)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		0.245
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		102.8
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023-10-23	WPX3 @ 100W / 3000K 480	231020002-S1
2	Goniophotometer Test	2023-10-23	WPX3 @ 100W / 3000K 480	231020002-S1
3	THD and PF Test	2023-10-23	WPX3 @ 100W / 3000K 480	231020002-S1

### Remark (If any)

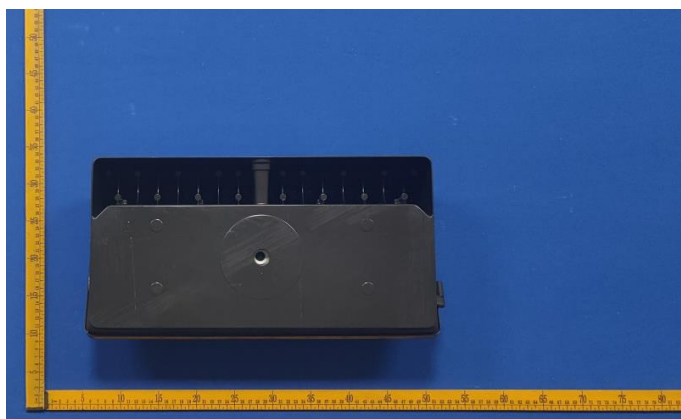
1. The results contained in this report pertain only to the tested samples.
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3. This report does not imply product certification, approval, or endorsement by NVLAP, or any agency of the Federal Government.

## 3.0 Product Description

Luminaire Description: Model No. WPX3 @ 100W / 3000K 480, color tunable from 3000K, 4000K and 5000K.

Electrical Specification: 480Vac, 50/60Hz

### Photos of Luminaire Characteristics



## 4.0 LM-79 Measurement and Test Results

### 4.1 Integrating Sphere Test

<b>Model No.</b>	WPX3 @ 100W / 3000K 480	<b>Sample ID</b>	231020002-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

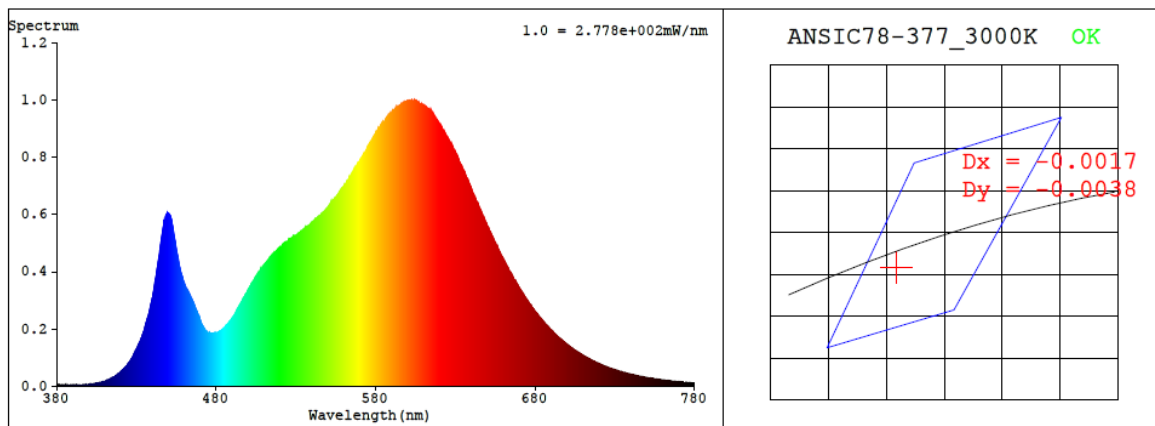
Test Method
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at <math>25 \pm 1^\circ\text{C}</math>.</p> <p>The sample 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 <math>\pm 0.2</math> percent under load.</p> <p>The sample was measured using <math>4\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
480.0	60	0.245	102.8	0.875

CCT (K)	CRI	R9	Duv	Rf	Rg	IES Rcs,h1
3117	82.6	7	-0.0013	84	97	-11%

## 4.1 Integrating Sphere Test



### Colorimetric Parameters

Chromaticity Coordinate:  $x = 0.4271$   $y = 0.3974$  /  $u' = 0.2471$   $v' = 0.5172$  ( $duv = -1.28e-03$ )

CCT= 3117K      Prcp WL:    Ld=582.8nm      Purity=47.5%

Peak WL: Lp=604nm FWHM: =132.6nm Ratio:R=22.3% G=75.1% B=2.6%

Render Index: Ra = 82.6 AvgR = 76.9 TM30:Rf=84 Rg=97

EEl: 0.10192 A++ Highest

R1 =81    R2 =90    R3 =96    R4 =81    R5 =82    R6 =88    R7 =83

R8 =59    R9 =7    R10=78    R11=81    R12=72    R13=83    R14=99    R15=74

## 4.1 Integrating Sphere Test

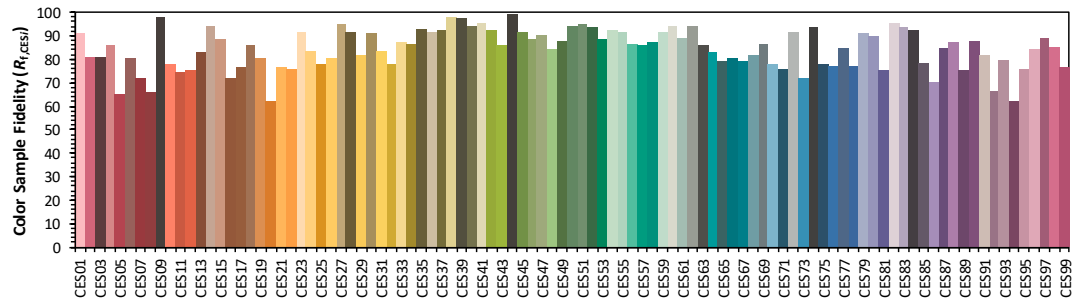
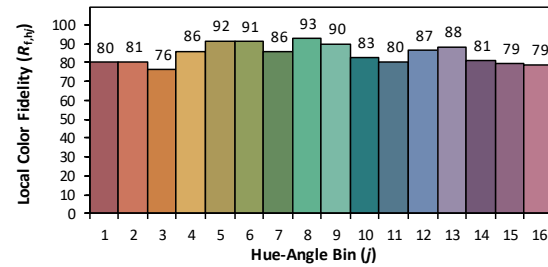
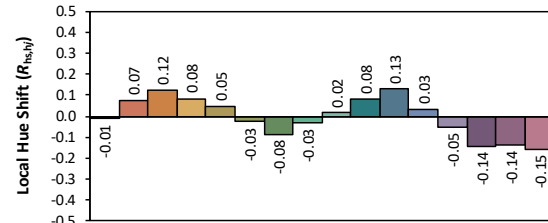
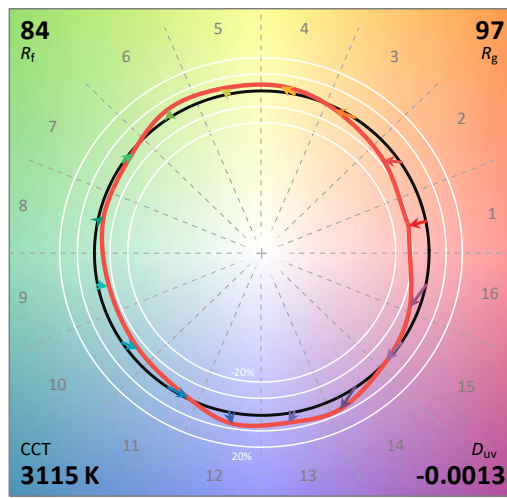
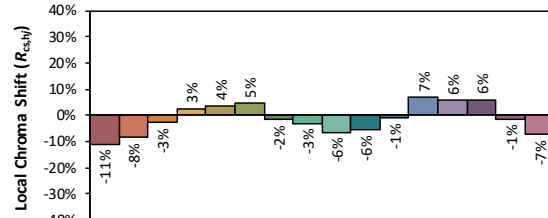
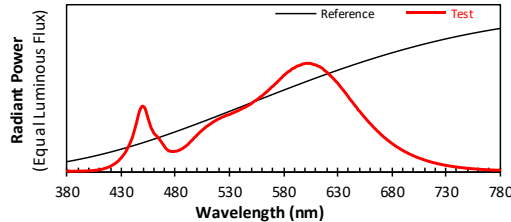
### ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2023/10/30

Model: WPX3 @ 100W / 3000K 480



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

$x$  0.4272  
 $y$  0.3972  
 $u'$  0.2472  
 $v'$  0.5172

CIE 13.3-1995  
(CRI)

$R_a$  83  
 $R_g$  7

## 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	3.90E-06	447	5.64E-04	514	4.51E-04	581	8.91E-04	648	5.88E-04	715	9.27E-05
381	4.90E-06	448	5.85E-04	515	4.57E-04	582	9.01E-04	649	5.70E-04	716	8.96E-05
382	4.70E-06	449	6.00E-04	516	4.64E-04	583	9.09E-04	650	5.61E-04	717	8.70E-05
383	1.90E-06	450	6.03E-04	517	4.68E-04	584	9.17E-04	651	5.50E-04	718	8.38E-05
384	3.80E-06	451	5.94E-04	518	4.74E-04	585	9.25E-04	652	5.37E-04	719	8.23E-05
385	2.70E-06	452	5.81E-04	519	4.81E-04	586	9.28E-04	653	5.24E-04	720	7.91E-05
386	3.50E-06	453	5.51E-04	520	4.85E-04	587	9.38E-04	654	5.13E-04	721	7.71E-05
387	4.20E-06	454	5.15E-04	521	4.89E-04	588	9.46E-04	655	5.01E-04	722	7.43E-05
388	3.00E-06	455	4.80E-04	522	4.96E-04	589	9.52E-04	656	4.90E-04	723	7.17E-05
389	2.80E-06	456	4.51E-04	523	5.01E-04	590	9.54E-04	657	4.78E-04	724	6.95E-05
390	3.80E-06	457	4.18E-04	524	5.05E-04	591	9.64E-04	658	4.67E-04	725	6.75E-05
391	4.00E-06	458	3.95E-04	525	5.07E-04	592	9.68E-04	659	4.54E-04	726	6.53E-05
392	4.50E-06	459	3.76E-04	526	5.15E-04	593	9.74E-04	660	4.45E-04	727	6.32E-05
393	4.30E-06	460	3.56E-04	527	5.16E-04	594	9.76E-04	661	4.35E-04	728	6.14E-05
394	4.30E-06	461	3.44E-04	528	5.21E-04	595	9.78E-04	662	4.23E-04	729	5.93E-05
395	4.90E-06	462	3.35E-04	529	5.24E-04	596	9.84E-04	663	4.13E-04	730	5.77E-05
396	4.80E-06	463	3.24E-04	530	5.26E-04	597	9.87E-04	664	4.01E-04	731	5.59E-05
397	5.40E-06	464	3.12E-04	531	5.30E-04	598	9.93E-04	665	3.94E-04	732	5.43E-05
398	6.10E-06	465	3.00E-04	532	5.35E-04	599	9.94E-04	666	3.82E-04	733	5.23E-05
399	5.90E-06	466	2.87E-04	533	5.40E-04	600	9.96E-04	667	3.72E-04	734	5.12E-05
400	6.00E-06	467	2.72E-04	534	5.44E-04	601	9.99E-04	668	3.64E-04	735	4.92E-05
401	7.80E-06	468	2.59E-04	535	5.49E-04	602	9.97E-04	669	3.54E-04	736	4.78E-05
402	7.90E-06	469	2.45E-04	536	5.53E-04	603	9.97E-04	670	3.44E-04	737	4.58E-05
403	8.60E-06	470	2.31E-04	537	5.58E-04	604	9.99E-04	671	3.35E-04	738	4.45E-05
404	9.40E-06	471	2.16E-04	538	5.60E-04	605	9.97E-04	672	3.26E-04	739	4.36E-05
405	1.09E-05	472	2.07E-04	539	5.66E-04	606	9.94E-04	673	3.17E-04	740	4.21E-05
406	1.16E-05	473	1.97E-04	540	5.72E-04	607	9.91E-04	674	3.09E-04	741	4.04E-05
407	1.36E-05	474	1.91E-04	541	5.76E-04	608	9.86E-04	675	3.01E-04	742	3.93E-05
408	1.36E-05	475	1.87E-04	542	5.83E-04	609	9.86E-04	676	2.92E-04	743	3.80E-05
409	1.62E-05	476	1.86E-04	543	5.86E-04	610	9.83E-04	677	2.85E-04	744	3.67E-05
410	1.70E-05	477	1.85E-04	544	5.90E-04	611	9.76E-04	678	2.78E-04	745	3.59E-05
411	1.94E-05	478	1.84E-04	545	5.95E-04	612	9.73E-04	679	2.69E-04	746	3.47E-05
412	2.14E-05	479	1.86E-04	546	6.01E-04	613	9.69E-04	680	2.62E-04	747	3.38E-05
413	2.35E-05	480	1.88E-04	547	6.07E-04	614	9.64E-04	681	2.55E-04	748	3.26E-05
414	2.76E-05	481	1.87E-04	548	6.12E-04	615	9.58E-04	682	2.47E-04	749	3.13E-05
415	3.03E-05	482	1.92E-04	549	6.18E-04	616	9.53E-04	683	2.41E-04	750	2.99E-05
416	3.23E-05	483	1.94E-04	550	6.24E-04	617	9.42E-04	684	2.34E-04	751	2.92E-05
417	3.72E-05	484	2.00E-04	551	6.32E-04	618	9.32E-04	685	2.27E-04	752	2.87E-05
418	4.05E-05	485	2.04E-04	552	6.41E-04	619	9.26E-04	686	2.21E-04	753	2.72E-05
419	4.38E-05	486	2.10E-04	553	6.47E-04	620	9.16E-04	687	2.15E-04	754	2.70E-05
420	4.93E-05	487	2.15E-04	554	6.54E-04	621	9.09E-04	688	2.09E-04	755	2.58E-05
421	5.53E-05	488	2.23E-04	555	6.60E-04	622	8.97E-04	689	2.02E-04	756	2.52E-05
422	6.02E-05	489	2.29E-04	556	6.67E-04	623	8.90E-04	690	1.97E-04	757	2.40E-05
423	6.72E-05	490	2.37E-04	557	6.76E-04	624	8.77E-04	691	1.91E-04	758	2.37E-05
424	7.27E-05	491	2.45E-04	558	6.84E-04	625	8.70E-04	692	1.86E-04	759	2.29E-05
425	7.99E-05	492	2.54E-04	559	6.92E-04	626	8.59E-04	693	1.80E-04	760	2.25E-05
426	8.78E-05	493	2.65E-04	560	6.97E-04	627	8.49E-04	694	1.75E-04	761	2.14E-05
427	9.68E-05	494	2.76E-04	561	7.05E-04	628	8.38E-04	695	1.70E-04	762	2.05E-05
428	1.06E-04	495	2.85E-04	562	7.16E-04	629	8.26E-04	696	1.65E-04	763	2.02E-05
429	1.18E-04	496	2.95E-04	563	7.22E-04	630	8.18E-04	697	1.61E-04	764	1.95E-05
430	1.29E-04	497	3.06E-04	564	7.33E-04	631	8.05E-04	698	1.55E-04	765	1.88E-05
431	1.41E-04	498	3.17E-04	565	7.38E-04	632	7.91E-04	699	1.52E-04	766	1.83E-05
432	1.53E-04	499	3.25E-04	566	7.49E-04	633	7.77E-04	700	1.47E-04	767	1.79E-05
433	1.67E-04	500	3.36E-04	567	7.59E-04	634	7.67E-04	701	1.42E-04	768	1.73E-05
434	1.82E-04	501	3.46E-04	568	7.68E-04	635	7.53E-04	702	1.38E-04	769	1.65E-05
435	2.01E-04	502	3.57E-04	569	7.79E-04	636	7.43E-04	703	1.33E-04	770	1.63E-05
436	2.19E-04	503	3.65E-04	570	7.86E-04	637	7.29E-04	704	1.30E-04	771	1.58E-05
437	2.40E-04	504	3.74E-04	571	7.94E-04	638	7.18E-04	705	1.26E-04	772	1.52E-05
438	2.61E-04	505	3.84E-04	572	8.05E-04	639	7.04E-04	706	1.22E-04	773	1.47E-05
439	2.85E-04	506	3.91E-04	573	8.14E-04	640	6.90E-04	707	1.19E-04	774	1.46E-05
440	3.08E-04	507	4.00E-04	574	8.22E-04	641	6.74E-04	708	1.15E-04	775	1.40E-05
441	3.43E-04	508	4.09E-04	575	8.35E-04	642	6.62E-04	709	1.12E-04	776	1.36E-05
442	3.76E-04	509	4.17E-04	576	8.42E-04	643	6.49E-04	710	1.09E-04	777	1.29E-05
443	4.13E-04	510	4.23E-04	577	8.54E-04	644	6.38E-04	711	1.05E-04	778	1.27E-05
444	4.49E-04	511	4.30E-04	578	8.63E-04	645	6.23E-04	712	1.02E-04	779	1.27E-05
445	4.90E-04	512	4.37E-04	579	8.72E-04	646	6.12E-04	713	9.82E-05	780	1.27E-05
446	5.30E-04	513	4.42E-04	580	8.84E-04	647	5.98E-04	714	9.62E-05	N/A	N/A



## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

<b>Model No.</b>	WPX3 @ 100W / 3000K 480	<b>Sample ID</b>	231020002-S1
<b>Operate time (Min.)</b>	30	<b>Stabilization time (Min.)</b>	60
<b>Temperature (°C)</b>	25.0	<b>Humidity (%RH)</b>	42.1

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 <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>	480.0	60	0.245	102.8	0.875
<b>NON-WORST CASE</b>	N/A	N/A	N/A	N/A	N/A

#### Test Result

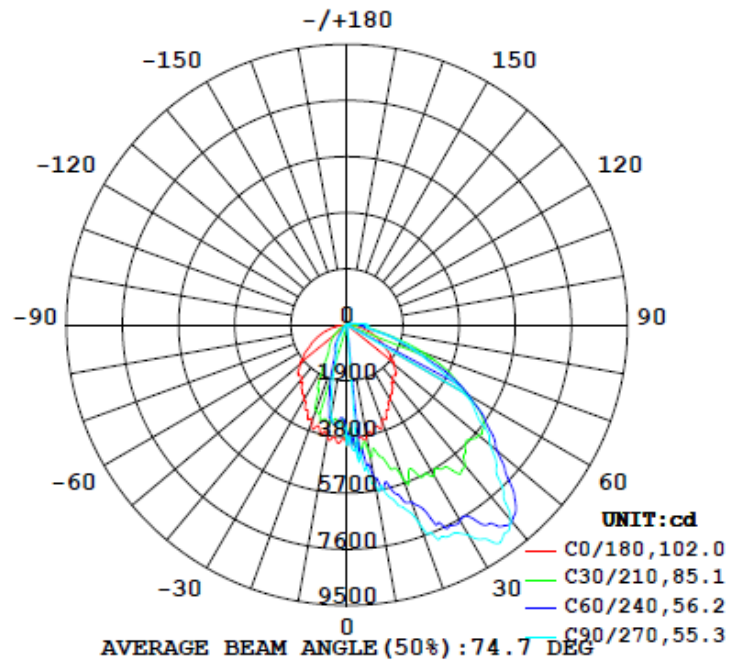
Result Type	Flux (lm)	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)	Zonal Lumen Requirement	BUG
		C0-180	C90-270	C0-180	C90-270		(80°-90°)	
<b>0°-180° zones</b>	14082	107.0	146.0	54.6	101.7	137.0	2.0%	B2-U3-G3
<b>0°-90° zones</b>	13711	107.0	146.0	54.6	101.7	133.4	2.1%	B2-U3-G3



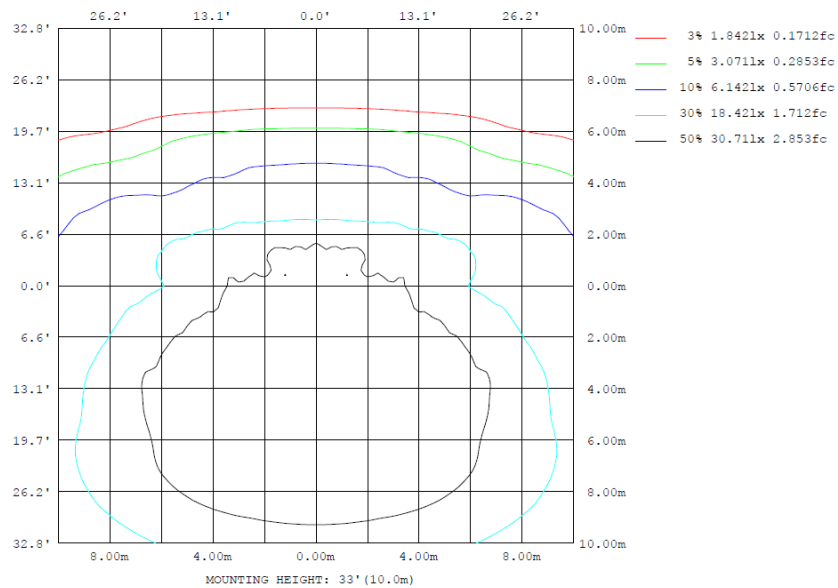
## 4.2 Goniophotometer Test

### Lighting Distribution Curve

**LUMINOUS INTENSITY DISTRIBUTION DIAGRAM**



### Isolux Plot



## 4.2 Goniophotometer Test

### Zonal Lumen Summary

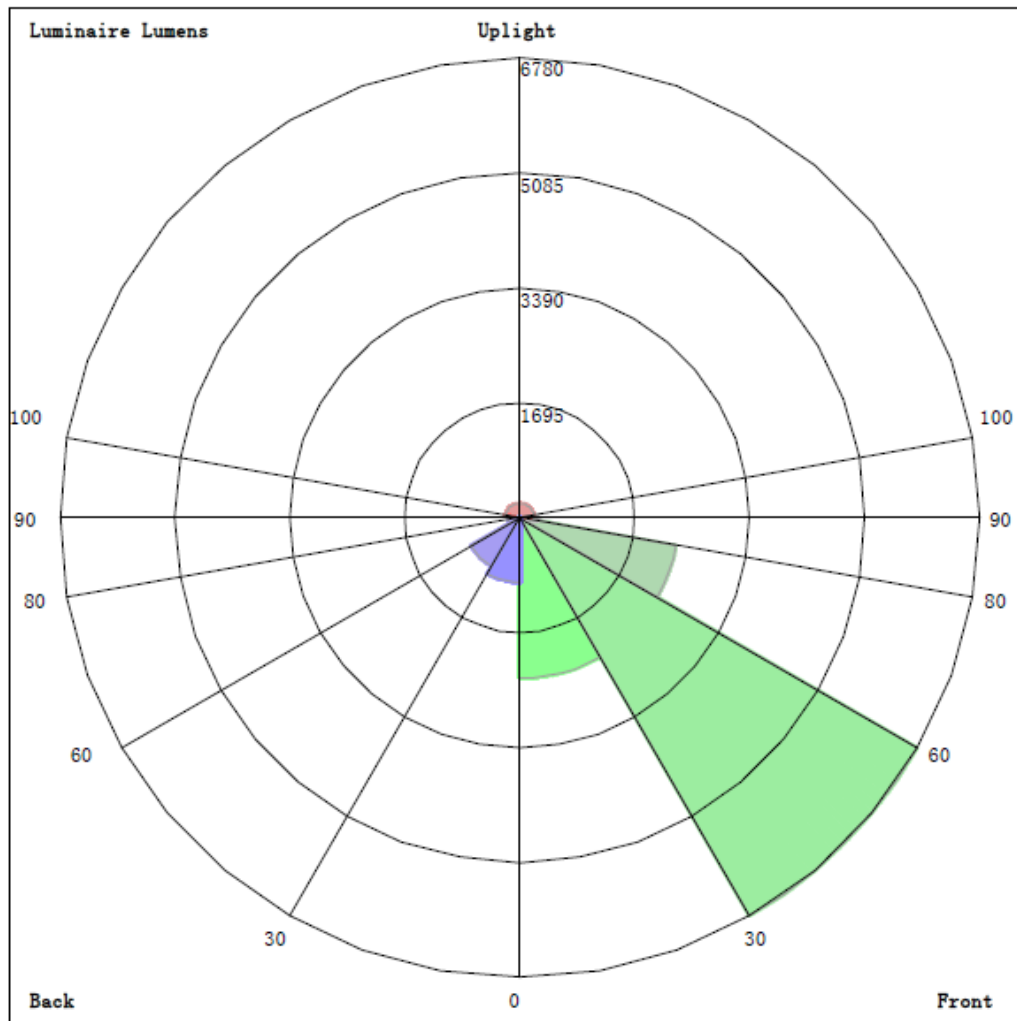
ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	ℓlum, lamp
10	3852	4784	5468	4784	3852	3244	3139	3244	0- 10	362.6	362.6	2.58, 2.58
20	3455	6051	7135	6051	3455	2041	1067	2041	10- 20	1121	1483	10.5, 10.5
30	2954	7319	8216	7319	2954	978.9	588.1	978.9	20- 30	1838	3321	23.6, 23.6
40	2377	7333	8607	7333	2377	565.2	198.2	565.2	30- 40	2477	5798	41.2, 41.2
50	2084	7091	6344	7091	2084	249.9	91.96	249.9	40- 50	2710	8508	60.4, 60.4
60	1452	5022	4488	5022	1452	124.6	34.76	124.6	50- 60	2416	10924	77.6, 77.6
70	946.6	2543	2351	2543	946.6	21.22	2.774	21.22	60- 70	1696	12620	89.6, 89.6
80	399.0	814.5	752.4	814.5	399.0	8.316	3.657	8.316	70- 80	805.2	13425	95.3, 95.3
90	35.44	293.9	696.6	293.9	35.44	6.155	4.827	6.155	80- 90	285.4	13711	97.4, 97.4
100	36.70	227.6	299.1	227.6	36.70	6.517	5.746	6.517	90-100	162.3	13873	98.5, 98.5
110	27.69	76.66	117.6	76.66	27.69	4.258	6.997	4.258	100-110	63.29	13936	99, 99
120	22.49	142.3	84.98	142.3	22.49	3.974	4.752	3.974	110-120	43.01	13979	99.3, 99.3
130	11.68	115.4	137.6	115.4	11.68	3.997	5.540	3.997	120-130	45.21	14025	99.6, 99.6
140	2.578	67.14	133.1	67.14	2.578	4.312	5.867	4.312	130-140	33.79	14058	99.8, 99.8
150	2.272	30.08	61.48	30.08	2.272	4.779	5.515	4.779	140-150	16.77	14075	100, 100
160	2.662	2.156	19.25	2.156	2.662	4.934	4.810	4.934	150-160	5.162	14080	100, 100
170	3.131	2.949	3.143	2.949	3.131	3.998	3.483	3.998	160-170	1.309	14082	100, 100
180	3.646	3.506	3.148	3.506	3.646	3.457	3.190	3.457	170-180	0.3302	14082	100, 100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

	Zonal (lm)		Total (lm)	Percent
0-10	362.62	0-10	362.62	2.58%
10-20	1120.56	0-20	1483.18	10.53%
20-30	1837.81	0-30	3320.99	23.58%
30-40	2476.79	0-40	5797.78	41.17%
40-50	2710.20	0-50	8507.98	60.42%
50-60	2415.66	0-60	10923.64	77.57%
60-70	1696.47	0-70	12620.11	89.62%
70-80	805.20	0-80	13425.31	95.34%
80-90	285.44	0-90	13710.75	97.37%
90-100	162.33	0-100	13873.08	98.52%
100-110	63.29	0-110	13936.37	98.97%
110-120	43.01	0-120	13979.38	99.27%
120-130	45.21	0-130	14024.59	99.60%
130-140	33.79	0-140	14058.38	99.83%
140-150	16.77	0-150	14075.15	99.95%
150-160	5.16	0-160	14080.31	99.99%
160-170	1.31	0-170	14081.62	100.00%
170-180	0.33	0-180	14081.95	100.00%

## 4.2 Goniophotometer Test

LCS/BUG

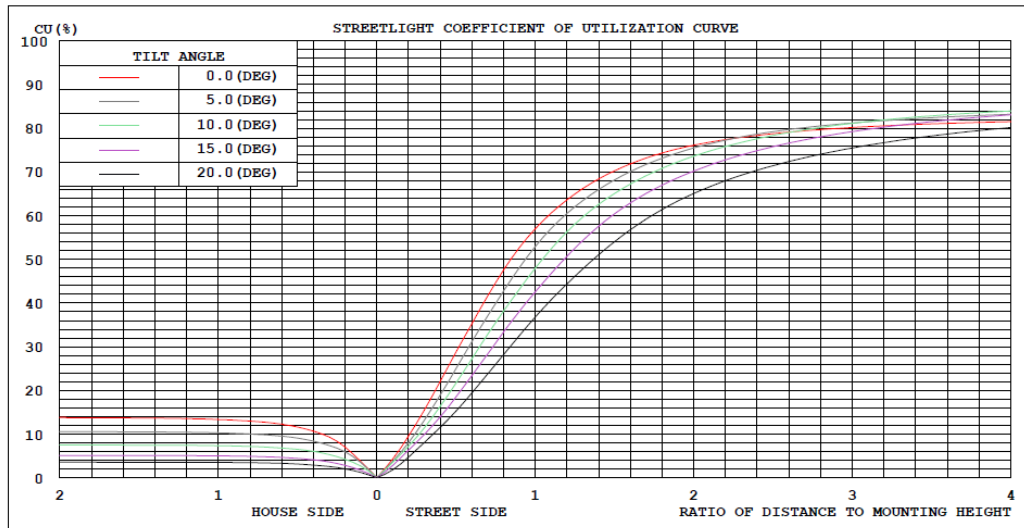


### LUMINAIRE CLASSIFICATION SYSTEM (LCS)

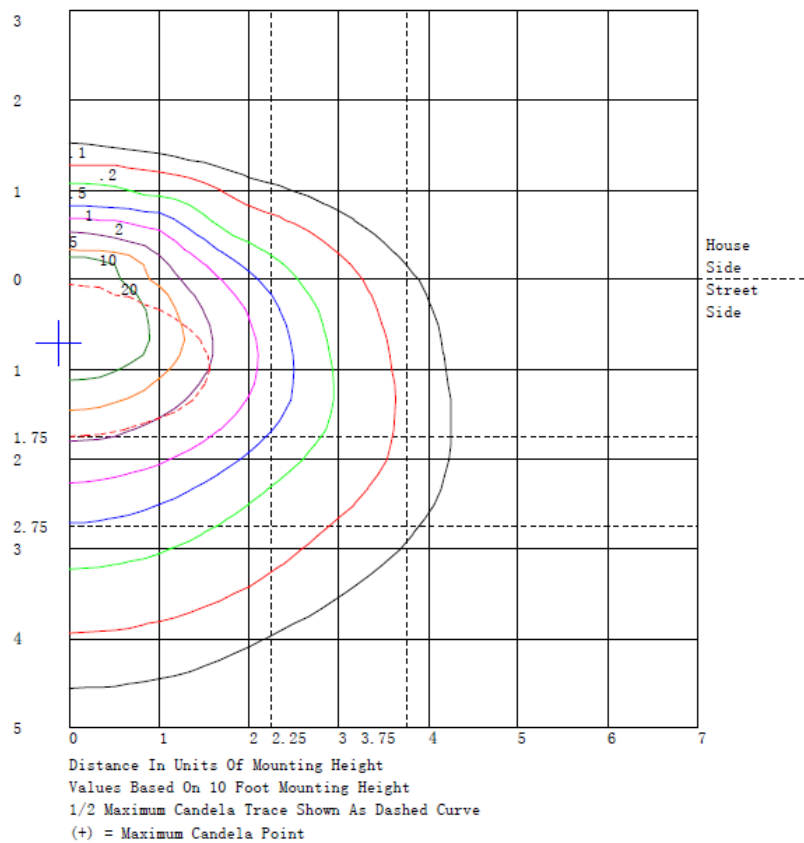
	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	2370.2	N.A.	16.8
FM - Front-Medium (30-60)	6779.5	N.A.	48.1
FH - Front-High (60-80)	2342.8	N.A.	16.6
FVH - Front-Very High (80-90)	269.1	N.A.	1.9
BL - Back-Low (0-30)	950.8	N.A.	6.8
BM - Back-Medium (30-60)	823.2	N.A.	5.8
BH - Back-High (60-80)	158.9	N.A.	1.1
BVH - Back-Very High (80-90)	16.3	N.A.	0.1
UL - Uplight-Low (90-100)	162.3	N.A.	1.2
UH - Uplight-High (100-180)	208.9	N.A.	1.5
Total	14082.0	N.A.	100.0
BUG Rating	B2-U3-G3		

## 4.2 Goniophotometer Test

### Coefficients of Utilization



### Isolines



## 4.2 Goniophotometer Test

### Luminous Distribution Intensity Data

Table--1

UNIT: cd

C (DEG) y	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	4088	4087	4086	4086	4088	4089	4090	4087	4084	4080	4077	4074	4071	4067	4064	4062	4063	4066	4068
5	3988	3942	3907	3883	3854	3849	3883	4050	4221	4346	4237	4092	3969	4040	4164	4316	4464	4592	4675
10	3852	3775	3773	3846	4046	4282	4513	4616	4698	4784	4969	5149	5293	5279	5234	5194	5290	5393	5468
15	3617	3707	3830	3985	4170	4389	4647	5015	5374	5675	5745	5750	5732	5802	5883	5965	6040	6099	6131
20	3455	3689	3967	4289	4709	5132	5519	5749	5921	6051	6168	6276	6386	6547	6711	6865	6997	7091	7135
25	3179	3417	3718	4082	4564	5070	5559	5919	6237	6527	6835	7120	7371	7563	7714	7824	7898	7933	7930
30	2954	3341	3769	4238	4777	5335	5889	6433	6920	7319	7500	7602	7663	7787	7906	8015	8109	8179	8216
35	2651	3236	3802	4347	4867	5370	5860	6362	6842	7285	7657	7984	8270	8537	8758	8925	8996	9020	9011
40	2377	2926	3512	4137	4868	5586	6242	6655	7003	7333	7633	7834	8304	8688	8793	8794	8733	8686	8637
45	2317	3012	3653	4242	4728	5198	5688	6389	7069	7647	7897	7999	7982	7879	7722	7540	7376	7244	7170
50	2084	2696	3312	3931	4585	5219	5810	6360	6801	7091	7032	6856	6638	6570	6524	6489	6423	6370	6344
55	1803	2253	2779	3381	4188	4973	5637	5876	5951	5919	5895	5833	5749	5662	5574	5495	5438	5402	5394
60	1452	1917	2415	2944	3592	4206	4721	4940	5029	5022	4965	4872	4766	4711	4665	4624	4561	4511	4488
65	1204	1637	2072	2509	3012	3469	3830	3936	3934	3861	3785	3687	3578	3479	3387	3309	3255	3224	3219
70	947	1201	1476	1769	2151	2500	2766	2767	2677	2543	2458	2380	2320	2305	2307	2320	2325	2335	2351
75	679	813	961	1122	1340	1538	1684	1654	1576	1486	1481	1490	1504	1493	1480	1469	1465	1467	1478
80	399	455	525	609	738	859	950	930	878	814	787	768	756	756	761	766	760	754	752
85	141	184	232	286	357	425	482	495	497	498	520	549	582	619	656	691	723	748	760
90	35.4	69.1	102	134	165	195	223	240	261	294	367	448	529	587	635	671	689	696	697
95	29.3	48.6	68.4	88.9	107	128	154	196	242	289	332	370	400	414	421	423	429	433	435
100	36.7	38.5	42.6	48.9	52.8	62.4	81.2	129	181	228	241	246	248	260	273	286	293	297	299
105	28.1	28.0	32.3	41.1	59.3	78.3	94.3	95.4	92.3	87.8	87.9	89.0	91.1	95.2	99.5	103	105	105	104
110	27.7	22.8	27.3	41.2	76.7	113	140	123	99.0	76.7	87.4	104	120	119	115	110	112	114	118
115	29.7	19.3	18.7	27.8	54.2	84.7	114	130	137	134	105	72.4	42.7	39.2	43.1	50.9	54.9	58.5	61.0
120	22.5	10.9	9.10	17.1	41.2	70.4	99.8	119	133	142	143	139	131	121	109	98.6	90.7	85.9	85.0
125	16.3	6.57	5.19	12.1	32.0	56.7	82.9	104	122	136	142	145	145	142	137	133	132	132	133
130	11.7	2.37	0.38	5.71	22.1	43.0	65.6	83.9	101	115	128	138	144	144	141	138	137	137	138
135	2.89	0.06	1.37	6.80	17.9	32.0	47.9	63.7	79.6	94.9	109	122	132	138	142	144	147	148	148
140	2.58	6.36	10.8	16.0	21.6	28.1	35.8	45.5	56.1	67.1	78.2	88.8	98.5	106	112	118	125	130	133
145	2.37	4.29	6.85	10.1	13.8	18.2	23.5	29.8	37.1	45.1	55.0	64.8	73.8	80.0	84.8	88.4	91.6	93.6	94.3
150	2.27	4.10	5.16	5.46	3.08	1.37	1.78	10.1	20.1	30.1	34.7	38.1	41.2	46.5	51.6	56.2	59.3	61.1	61.5
155	2.41	1.85	1.87	2.46	3.72	5.48	7.68	10.2	13.1	16.1	19.6	23.0	26.2	28.8	30.9	32.4	33.3	33.7	33.6
160	2.66	2.52	2.49	2.58	2.96	3.33	3.56	2.69	2.05	2.16	4.90	8.35	12.0	14.6	16.7	18.3	19.0	19.3	19.2
165	2.89	2.91	2.92	2.90	2.79	2.72	2.74	3.03	3.45	3.99	4.95	5.76	6.16	5.06	3.66	2.32	2.06	2.11	2.32
170	3.13	3.16	3.18	3.18	3.17	3.15	3.12	3.07	3.01	2.95	2.88	2.82	2.79	2.86	2.95	3.05	3.08	3.11	3.14
175	3.31	3.36	3.38	3.40	3.38	3.36	3.33	3.30	3.26	3.22	3.18	3.13	3.08	3.02	2.97	2.92	2.86	2.82	2.81
180	3.65	3.67	3.69	3.69	3.67	3.65	3.62	3.59	3.55	3.51	3.43	3.35	3.29	3.33	3.37	3.40	3.31	3.22	3.15

UNIT: cd																			
y	C (DEG)																		
	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	4066	4063	4062	4064	4067	4071	4074	4077	4080	4084	4087	4090	4089	4088	4086	4086	4087	4088	4078
5	4592	4464	4316	4164	4040	3969	4092	4237	4346	4221	4050	3883	3849	3854	3883	3907	3942	3988	3704
10	5393	5290	5194	5234	5279	5293	5149	4969	4784	4698	4616	4513	4282	4046	3846	3773	3775	3852	3575
15	6099	6040	5965	5883	5802	5732	5750	5745	5675	5374	5015	4647	4389	4170	3985	3830	3707	3617	3430
20	7091	6997	6865	6711	6547	6386	6276	6168	6051	5921	5749	5519	5132	4709	4289	3967	3689	3455	3441
25	7933	7898	7824	7714	7563	7371	7120	6835	6527	6237	5919	5559	5070	4564	4082	3718	3417	3179	3199
30	8179	8109	8015	7906	7787	7663	7602	7500	7319	6920	6433	5889	5335	4777	4238	3769	3341	2954	3201
35	9020	8996	8925	8758	8537	8270	7984	7657	7285	6842	6362	5860	5370	4867	4347	3802	3236	2651	2814
40	8637	8686	8733	8794	8793	8688	8304	7833	7333	7003	6655	6242	5586	4868	4137	3512	2926	2377	2379
45	7244	7376	7540	7722	7879	7982	7999	7897	7647	7069	6389	5688	5198	4728	4242	3653	3012	2317	2102
50	6370	6423	6489	6524	6570	6638	6856	7032	7091	6801	6360	5810	5219	4585	3931	3312	2696	2084	1693
55	5402	5438	5495	5574	5662	5749	5833	5895	5919	5951	5876	5637	4973	4188	3381	2779	2253	1803	1387
60	4511	4561	4624	4665	4711	4766	4872	4965	5022	5029	4940	4721	4206	3592	2944	2415	1917	1452	1082
65	3224	3255	3309	3387	3479	3578	3687	3785	3861	3934	3936	3830	3469	3012	2509	2072	1637	1204	888
70	2335	2325	2320	2307	2305	2320	2380	2458	2543	2677	2767	2766	2500	2151	1769	1476	1201	947	719
75	1467	1465	1469	1480	1493	1504	1490	1481	1486	1576	1654	1684	1538	1340	1122	961	813	679	510
80	754	760	766	761	756	756	768	787	814	878	930	950	859	738	609	525	455	399	292
85	748	723	691	656	619	582	549	520	498	497	495	482	425	357	286	232	184	141	112
90	696	689	671	635	587	529	448	367	294	261	240	223	195	165	134	102	69.1	35.4	36.1
95	433	429	423	421	414	400	370	332	289	242	196	154	128	107	88.9	68.4	48.6	29.3	27.3
100	297	293	286	273	260	248	246	241	228	181	129	81.2	62.4	52.8	48.9	42.6	38.5	36.7	30.1
105	105	105	103	99.5	95.2	91.1	89.0	87.9	87.8	92.3	95.4	94.3	78.3	59.3	41.1	32.3	28.0	28.1	23.1
110	114	112	110	115	119	120	104	87.4	76.7	99.0	123	140	113	76.7	41.2	27.3	22.8	27.7	20.0
115	58.5	54.9	50.9	43.1	39.2	42.7	72.4	105	134	137	130	114	84.7	54.2	27.8	18.7	19.3	29.7	21.8
120	85.9	90.7	98.6	109	121	131	139	143	142	133	119	99.8	70.4	41.2	17.1	9.10	10.9	22.5	17.2
125	132	132	133	137	142	145	145	142	136	122	104	82.9	56.7	32.0	12.1	5.19	6.57	16.3	13.3
130	137	137	138	141	144	144	138	128	115	101	83.9	65.6	43.0	22.1	5.71	0.38	2.37	11.7	10.1
135	148	147	144	142	138	132	122	109	94.9	79.6	63.7	47.9	32.0	17.9	6.80	1.37	0.06	2.89	3.63
140	130	125	118	112	106	98.5	88.8	78	72	67.1	56.1	45.5	35.8	28.1	21.6	16.0	10.8	6.36	2.58
145	93.6	91.6	88.4	84.8	80.0	73.8	64.8	55.0	45.1	37.1	29.8	23.5	18.2	13.8	10.1	6.85	4.29	2.37	3.51
150	61.1	59.3	56.2	51.6	46.5	41.2	38.1	34.7	30.1	20.1	10.1	1.78	1.37	3.08	5.46	5.16	4.10	2.27	3.42
155	33.7	33.3	32.4	30.9	28.8	26.2	23.9	19.6	16.1	13.1	10.2	7.68	5.48	3.72	4.46	1.87	1.85	2.41	3.23
160	19.3	19.0	18.3	16.7	14.6	12.0	8.35	4.90	2.16	2.05	2.69	3.56	3.33	2.96	2.58	2.49	2.52	2.66	3.80
165	2.11	2.06	2.32	3.66	5.06	6.16	5.76	4.95	3.99	3.45	3.03	2.74	2.72	2.79	2.90	2.92	2.91	2.89	3.95
170	3.11	3.08	3.05	2.95	2.86	2.79	2.82	2.88	2.95	3.01	3.07	3.12	3.15	3.17	3.18	3.18	3.16	3.13	3.95
175	2.82	2.86	2.92	3.97	3.02	3.08	3.13	3.18	3.22	3.26	3.30	3.33	3.36	3.38	3.40	3.38	3.36	3.31	3.92
180	3.22	3.31	3.40	3.37	3.33	3.29	3.35	3.43	3.51	3.55	3.59	3.62	3.65	3.67	3.69	3.69	3.67	3.65	3.63



Table--3

UNIT: cd

C (DEG) y (DEG)	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
0	4070	4064	4062	4061	4060	4054	4049	4046	4051	4058	4066	4069	4070	4070	4070	4070	4068	4070	4070
5	3490	3348	3311	3319	3348	3332	3313	3296	3297	3297	3291	3247	3207	3188	3257	3338	3411	3338	3257
10	3379	3265	3283	3345	3410	3370	3310	3244	3207	3180	3163	3164	3171	3177	3166	3153	3139	3153	3166
15	3300	3227	3268	3324	3352	3226	3051	2850	2659	2475	2309	2193	2101	2027	1951	1892	1857	1892	1951
20	3406	3353	3307	3221	3073	2759	2402	2041	1760	1522	1333	1223	1157	1120	1088	1071	1067	1071	1088
25	3158	3056	2891	2667	2387	1989	1588	1235	1085	1008	976	932	904	885	866	853	847	853	866
30	3258	3123	2666	2117	1574	1297	1105	979	892	837	800	743	691	648	617	597	588	597	617
35	2807	2631	2146	1595	1083	917	846	819	717	616	525	456	401	360	334	319	315	319	334
40	2283	2089	1716	1308	927	752	640	565	460	369	295	254	229	216	205	200	198	200	205
45	1869	1616	1310	1010	741	573	451	364	291	240	209	199	199	205	201	198	195	198	201
50	1359	1083	883	727	600	461	342	250	213	197	190	161	133	110	98.5	93.0	92.0	93.0	98.5
55	1045	778	611	499	421	332	257	197	153	122	101	86.5	78.0	73.6	69.4	67.3	67.0	67.3	69.4
60	783	553	420	337	285	220	167	125	94.0	72.4	58.2	50.4	46.6	44.9	40.3	36.7	34.8	36.7	40.3
65	630	431	308	228	179	128	90.3	62.3	39.5	23.1	12.0	5.44	2.25	1.38	1.06	1.52	2.26	1.52	1.06
70	527	370	256	172	112	67.8	38.8	21.2	9.28	3.34	1.49	0.25	0.53	1.62	2.07	2.50	2.77	2.50	2.07
75	367	250	163	98.5	54.3	29.0	16.3	11.7	5.79	2.68	1.53	0.88	1.04	1.67	2.25	2.80	3.16	2.80	2.25
80	204	133	84.9	51.6	30.4	17.2	10.7	8.32	4.87	2.82	1.84	1.44	1.58	2.07	2.69	3.28	3.66	3.28	2.69
85	87.3	65.2	45.9	30.1	17.9	11.6	8.23	6.69	4.60	3.20	2.39	2.11	2.21	2.60	3.29	3.94	4.36	3.94	3.29
90	35.1	32.3	26.5	20.0	13.7	10.3	7.84	6.16	4.75	3.79	3.21	2.93	2.93	3.15	3.79	4.42	4.83	4.42	3.79
95	24.9	22.2	18.8	15.4	12.1	9.47	7.27	5.53	4.48	3.84	3.51	3.30	3.29	3.48	4.11	4.72	5.10	4.72	4.11
100	24.4	19.5	15.7	12.6	10.2	8.56	7.37	6.52	5.69	5.06	4.60	4.28	4.14	4.21	4.78	5.36	5.75	5.36	4.78
105	18.5	14.3	10.1	6.60	4.06	3.71	4.20	5.11	5.55	5.94	6.25	6.19	6.09	6.04	6.47	6.89	7.15	6.89	6.47
110	14.0	9.84	8.25	7.77	7.77	6.50	5.27	4.26	4.03	4.12	4.45	4.90	5.44	5.99	6.45	6.81	7.00	6.81	6.45
115	15.4	10.7	8.28	7.00	6.43	5.49	4.79	4.34	4.26	4.34	4.49	4.51	4.52	4.53	4.60	4.67	4.69	4.67	4.60
120	12.9	9.55	7.42	6.05	5.23	4.53	4.13	3.97	4.05	4.24	4.46	4.52	4.55	4.58	4.66	4.72	4.75	4.72	4.66
125	10.7	8.60	6.88	5.55	4.60	4.07	3.84	3.84	4.03	4.30	4.60	4.71	4.78	4.84	4.94	5.03	5.07	5.03	4.94
130	8.72	7.42	6.14	5.05	4.22	3.92	3.87	4.00	4.16	4.38	4.63	4.84	5.04	5.21	5.37	5.48	5.54	5.48	5.37
135	4.16	4.47	4.45	4.30	4.11	4.07	4.09	4.17	4.38	4.63	4.88	5.04	5.17	5.28	5.41	5.52	5.58	5.52	5.41
140	4.96	5.45	5.18	4.66	4.09	4.05	4.14	4.31	4.46	4.64	4.84	5.06	5.27	5.48	5.65	5.78	5.87	5.78	5.65
145	4.33	4.81	4.76	4.53	4.24	4.28	4.40	4.55	4.70	4.87	5.05	5.26	5.47	5.65	5.77	5.86	5.90	5.86	5.77
150	3.93	4.40	4.50	4.47	4.38	4.49	4.63	4.78	4.87	4.96	5.07	5.27	5.46	5.61	5.61	5.57	5.52	5.57	5.61
155	4.20	4.73	4.92	4.93	4.85	4.82	4.78	4.76	4.82	4.92	5.04	5.20	5.35	5.44	5.36	5.23	5.11	5.23	5.36
160	4.65	5.21	5.38	5.35	5.20	5.11	5.01	4.93	4.97	5.02	5.07	5.04	4.99	4.94	4.89	4.85	4.81	4.85	4.89
165	4.81	5.33	5.44	5.35	5.15	5.07	4.98	4.89	4.82	4.75	4.66	4.49	4.32	4.18	4.18	4.22	4.26	4.22	4.18
170	4.61	4.99	5.04	4.91	4.68	4.45	4.21	4.00	3.91	3.85	3.80	3.71	3.63	3.55	3.51	3.48	3.48	3.48	3.51
175	4.36	4.62	4.67	4.57	4.38	4.11	3.82	3.57	3.51	3.50	3.51	3.39	3.27	3.18	3.19	3.23	3.29	3.23	3.19
180	3.67	3.67	3.68	3.68	3.66	3.61	3.54	3.46	3.36	3.27	3.18	3.13	3.10	3.09	3.11	3.15	3.19	3.15	3.11

C (DEG) y (DEG)	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355				
0	4070	4070	4069	4066	4058	4051	4046	4049	4054	4060	4061	4062	4064	4070	4078				
5	3188	3207	3247	3291	3297	3297	3296	3313	3332	3348	3319	3311	3348	3490	3704				
10	3177	3171	3164	3163	3180	3207	3244	3310	3370	3410	3345	3283	3265	3379	3575				
15	2027	2101	2193	2309	2475	2659	2850	3051	3226	3352	3324	3268	3227	3300	3430				
20	1120	1157	1223	1333	1522	1760	2041	2402	2759	3073	3221	3307	3353	3406	3441				
25	885	904	932	976	1008	1085	1235	1588	1989	2387	2667	2891	3056	3158	3199				
30	648	691	743	800	837	892	979	1105	1297	1574	2117	2666	3123	3258	3201				
35	360	401	456	525	616	717	819	846	917	1083	1595	2146	2631	2807	2814				
40	216	229	254	295	369	460	565	640	752	927	1308	1716	2089	2283	2379				
45	205	199	199	209	240	291	364	451	573	741	1010	1310	1616	1869	2102				
50	110	133	161	190	197	213	250	342	461	600	727	883	1083	1359	1693				
55	73.6	78.0	86.5	101	122	153	197	257	332	421	499	611	778	1045	1387				
60	44.9	46.6	50.4	58.2	72.4	94.0	125	167	220	285	337	420	553	783	1082				
65	1.38	2.25	5.44	12.0	23.1	39.5	62.3	90.3	128	179	228	308	431	630	888				
70	1.62	0.53	0.25	1.49	3.34	9.28	21.2	38.8	67.8	112	172	256	370	527	719				
75	1.67	1.04	0.88	1.53	2.68	5.79	11.7	16.3	29.0	54.3	98.5	163	250	367	510				
80	2.07	1.58	1.44	1.84	2.82	4.87	8.32	10.7	17.2	30.4	51.6	84.9	133	204	292				
85	2.60	2.21	2.11	2.39	3.20	4.60	6.69	8.23	11.6	17.9	30.1	45.9	65.2	87.3	112				
90	3.15	2.93	2.93	3.21	3.79	4.75	6.16	7.84	10.3	13.7	20.0	26.5	32.3	35.1	36.1				
95	3.48	3.29	3.30	3.51	3.84	4.48	5.53	7.27	9.47	12.1	15.4	18.8	22.2	24.9	27.3				
100	4.21	4.14	4.28	4.60	5.06	5.69	6.52	7.37	8.56	10.2	12.6	15.7	19.5	24.4	30.1				
105	6.04	6.09	6.19	6.25	5.94	5.55	5.11	4.20	3.71	4.06	6.60	10.1	14.3	18.5	23.1				
110	5.99	5.44	4.90	4.45	4.12	4.03	4.26	5.27	6.50	7.77	7.77	8.25	9.84	14.0	20.0				
115	4.53	4.52	4.51	4.49	4.34	4.26	4.34	4.79	5.49	6.43	7.00	8.28	10.7	15.4	21.8				
120	4.58	4.55	4.52	4.46	4.24	4.05	3.97	4.13	4.53	5.23	6.05	7.42	9.55	12.9	17.2				
125	4.84	4.78	4.71	4.60	4.30	4.03	3.84	3.84	4.07	4.60	5.55	6.88	8.60	10.7	13.3				
130	5.21	5.04	4.84	4.63	4.38	4.16	4.00	3.87	3.92	4.22	5.05	6.14	7.42	8.72	10.1				
135	5.28	5.17	5.04	4.88	4.63	4.38	4.17	4.09	4.07	4.11	4.30	4.45	4.47	4.16	3.63				
140	5.48	5.27	5.06	4.84	4.64	4.46	4.31	4.14	4.05	4.09	4.66	5.18	5.45	4.96	4.01				
145	5.65	5.47	5.26	5.05	4.87	4.70	4.55	4.40	4.28	4.24	4.53	4.76	4.81	4.33	3.51				
150	5.61	5.46	5.27	5.07	4.96	4.87	4.78	4.63	4.49	4.38	4.47	4.50	4.40	3.93	3.22				
155	5.44	5.35	5.20	5.04	4.92	4.82	4.76	4.78	4.82	4.85	4.93	4.92	4.73	4.20	3.43				
160	4.94	4.99	5.04	5.07	5.02	4.97	4.93	5.01	5.11	5.20	5.35	5.38	5.21	4.65	3.80				
165	4.18	4.32	4.49	4.66	4.75	4.82	4.89	4.98	5.07	5.15	5.35	5.44	5.33	4.81	3.99				
170	3.55	3.63	3.71	3.80	3.85	3.91	4.00	4.21	4.45	4.68	4.91	5.04	4.99	4.61	3.99				
175	3.18	3.27	3.39	3.51	3.50	3.51	3.57	3.82	4.11	4.38	4.57	4.67	4.62	4.36	3.92				
180	3.09	3.10	3.13	3.18	3.27	3.36	3.46	3.54	3.61	3.66	3.68	3.68	3.67	3.67	3.66				

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

<b>Model No.</b>	WPX3 @ 100W / 3000K 480	<b>Sample ID</b>	231020002-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

<b>Voltage (Vac)</b>	<b>Frequency (Hz)</b>	<b>Current (A)</b>	<b>Power (W)</b>	<b>Power Factor</b>	<b>iTHD(%)</b>
480.0	60	0.245	102.8	0.875	14.45



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