

Photometric Test Report

Relevant Standards

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

Prepared For

RAB Lighting Inc.

Prepared By

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Date: 2023-11-16

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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		8052
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		140.0
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	300		7852
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	Standard	Premium	136.6
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		57.5
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2014	20.00%	120V	2.11
			277V	10.31
Power Factor (THD & PF – Section 4.3)	ANSI C82.77:2014	0.9	120V	0.996
			277V	0.913
Allowable CCTs* (K) (Integrating Sphere – Section 4.1)	IES LM-79-2008	7 steps	3045±175	3111
		4 steps	3045±100	
Minimum CRI (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	≥70		82.4
Minimum R9 (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	N/A		9
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		95
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%		2.8%
Input Voltage (V)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Cast		120.0
(Goniophotometer – Section 4.2)		Non-Worst Case		277.0
Input Current (A)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		0.481
(Goniophotometer – Section 4.2)		Non-Worst Case		0.224
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		57.5
(Goniophotometer – Section 4.2)		Non-Worst Case		56.7

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023-11-02	WPX2 @ 60W / 3000K	231101003-S1
2	Goniophotometer Test	2023-11-02	WPX2 @ 60W / 3000K	231101003-S1
3	THD and PF Test	2023-11-02	WPX2 @ 60W / 3000K	231101003-S1

Remark (If any)

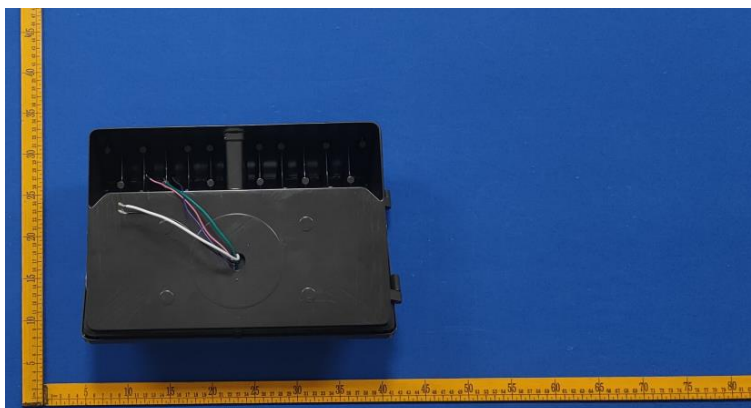
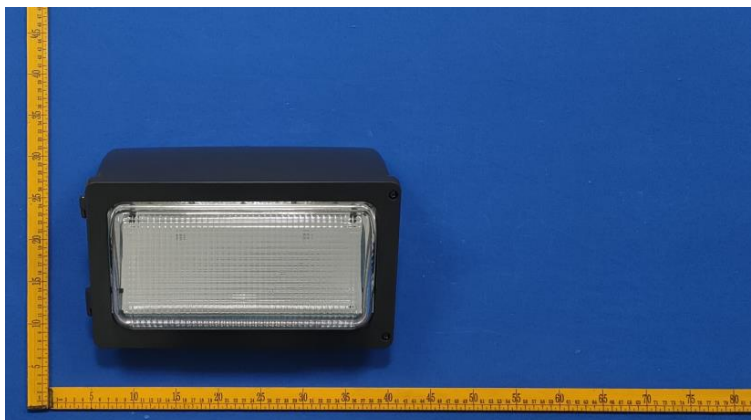
1. The results contained in this report pertain only to the tested samples.
2. This report shall not be reproduced, no limited part or full, without approval of Dongguan New Testing Centre Co., Ltd.
3. This report does not imply product certification, approval, or endorsement by NVLAP, or any agency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

3.0 Product Description

Luminaire Description: Model No. WPX2 @ 60W / 3000K, 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.	WPX2 @ 60W / 3000K	Sample ID	231101003-S1
Operate time (Min.)	10	Stabilization time (Min.)	60
Temperature (°C)	25.4	Humidity (%RH)	41.0

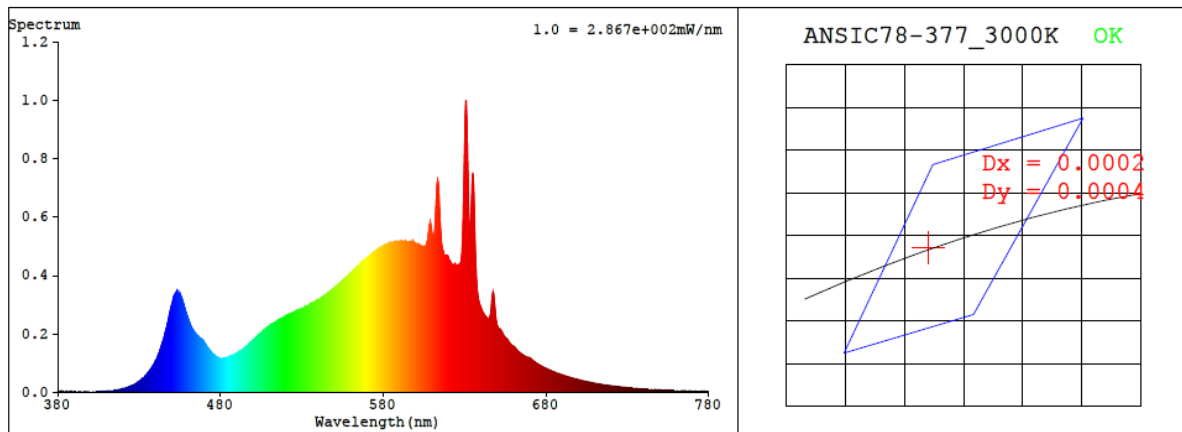
Test Method
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were made using 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	0.481	57.5	0.996
277.0	60	0.224	56.7	0.913

CCT (K)	CRI	R9	Duv	Rf	Rg	IES Rcs,h1
3111	82.4	9	0.0002	84	95	-12%

4.1 Integrating Sphere Test



Colorimetric Parameters

Chromaticity Coordinate: $x = 0.4295$ $y = 0.4018$ / $u' = 0.2468$ $v' = 0.5194$ ($duv=1.51e-04$)

CCT= 3111K Prcp WL: Ld=582.3nm Purity=49.5%

Peak WL: $\lambda_p=631\text{nm}$ FWHM: $=8.3\text{nm}$ Ratio: R=22.2% G=75.0% B=2.7%

Render Index: Ra = 82.4 AvgR = 76.4 TM30:Rf=83 Rg=95

EEl: 0.09767 A++ Highest

R1 =81 R2 =91 R3 =97 R4 =79 R5 =80 R6 =88 R7 =83

R8 =61 R9 =9 R10=78 R11=77 R12=67 R13=83 R14=99 R15=74

4.1 Integrating Sphere Test

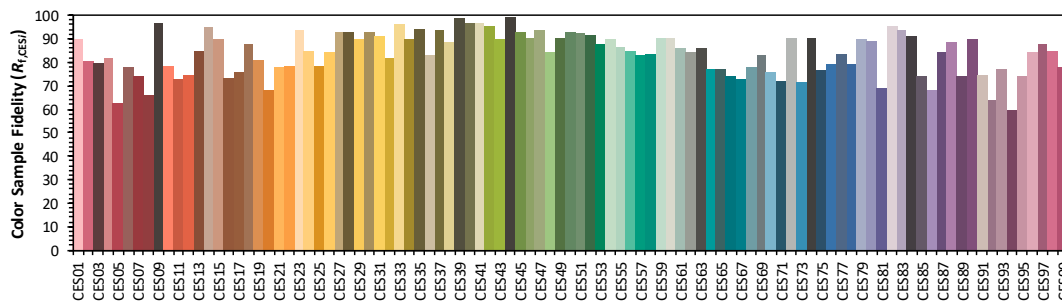
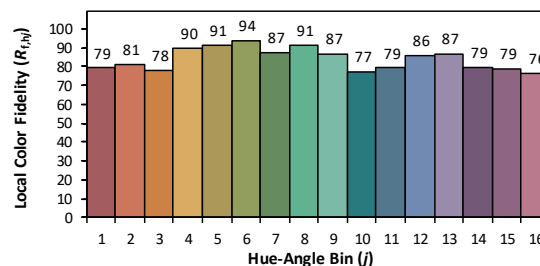
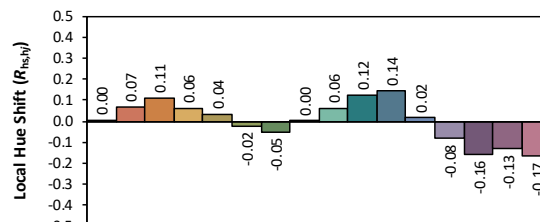
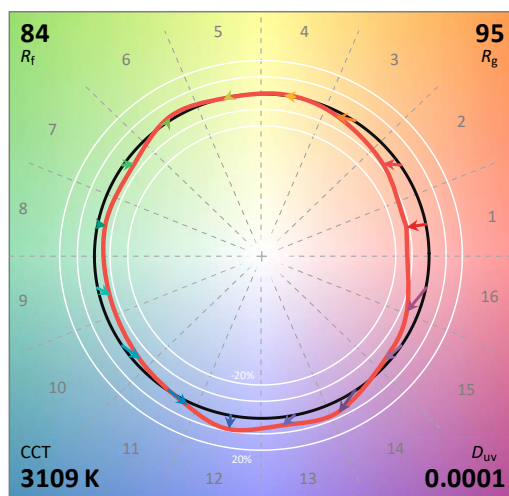
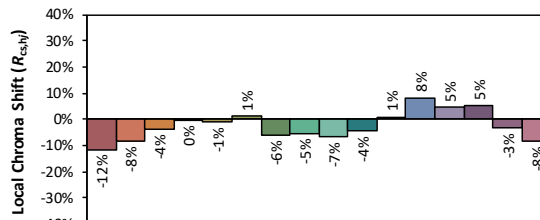
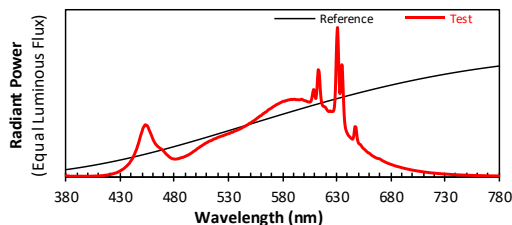
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2023/11/16

Model: WPX2 @ 60W / 3000K



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

x 0.4295
 y 0.4016
 u' 0.2468
 v' 0.5193

CIE 13.3-1995
(CRI)

R_a 82
 R_g 10

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	6.50E-06	447	2.27E-04	514	2.40E-04	581	5.05E-04	648	3.29E-04	715	2.64E-05
381	2.00E-06	448	2.54E-04	515	2.44E-04	582	5.04E-04	649	2.65E-04	716	2.52E-05
382	3.50E-06	449	2.79E-04	516	2.49E-04	583	5.08E-04	650	2.30E-04	717	2.43E-05
383	2.00E-06	450	3.00E-04	517	2.52E-04	584	5.09E-04	651	2.18E-04	718	2.36E-05
384	8.00E-07	451	3.24E-04	518	2.54E-04	585	5.12E-04	652	2.14E-04	719	2.31E-05
385	2.20E-06	452	3.35E-04	519	2.57E-04	586	5.14E-04	653	2.05E-04	720	2.24E-05
386	1.10E-06	453	3.47E-04	520	2.61E-04	587	5.15E-04	654	1.94E-04	721	2.15E-05
387	1.70E-06	454	3.43E-04	521	2.64E-04	588	5.17E-04	655	1.87E-04	722	2.10E-05
388	1.70E-06	455	3.39E-04	522	2.66E-04	589	5.16E-04	656	1.81E-04	723	2.03E-05
389	5.00E-07	456	3.24E-04	523	2.69E-04	590	5.17E-04	657	1.74E-04	724	1.95E-05
390	1.10E-06	457	3.06E-04	524	2.71E-04	591	5.18E-04	658	1.67E-04	725	1.90E-05
391	9.00E-07	458	2.89E-04	525	2.73E-04	592	5.16E-04	659	1.61E-04	726	1.87E-05
392	1.50E-06	459	2.71E-04	526	2.77E-04	593	5.15E-04	660	1.56E-04	727	1.78E-05
393	1.90E-06	460	2.53E-04	527	2.79E-04	594	5.15E-04	661	1.52E-04	728	1.72E-05
394	1.80E-06	461	2.37E-04	528	2.82E-04	595	5.14E-04	662	1.45E-04	729	1.67E-05
395	1.20E-06	462	2.24E-04	529	2.84E-04	596	5.14E-04	663	1.39E-04	730	1.58E-05
396	1.40E-06	463	2.14E-04	530	2.87E-04	597	5.16E-04	664	1.35E-04	731	1.55E-05
397	1.70E-06	464	2.06E-04	531	2.89E-04	598	5.18E-04	665	1.31E-04	732	1.52E-05
398	1.60E-06	465	1.99E-04	532	2.93E-04	599	5.13E-04	666	1.27E-04	733	1.48E-05
399	1.20E-06	466	1.93E-04	533	2.96E-04	600	5.10E-04	667	1.23E-04	734	1.43E-05
400	1.90E-06	467	1.87E-04	534	2.97E-04	601	5.07E-04	668	1.21E-04	735	1.37E-05
401	2.00E-06	468	1.84E-04	535	3.01E-04	602	5.06E-04	669	1.20E-04	736	1.32E-05
402	1.40E-06	469	1.77E-04	536	3.04E-04	603	5.02E-04	670	1.18E-04	737	1.28E-05
403	2.00E-06	470	1.70E-04	537	3.07E-04	604	5.00E-04	671	1.13E-04	738	1.23E-05
404	2.20E-06	471	1.62E-04	538	3.10E-04	605	4.99E-04	672	1.08E-04	739	1.20E-05
405	2.30E-06	472	1.53E-04	539	3.13E-04	606	5.01E-04	673	1.04E-04	740	1.16E-05
406	2.30E-06	473	1.46E-04	540	3.16E-04	607	5.19E-04	674	1.00E-04	741	1.12E-05
407	3.30E-06	474	1.40E-04	541	3.20E-04	608	5.60E-04	675	9.65E-05	742	1.07E-05
408	2.70E-06	475	1.33E-04	542	3.23E-04	609	5.83E-04	676	9.31E-05	743	1.03E-05
409	3.30E-06	476	1.27E-04	543	3.29E-04	610	5.42E-04	677	8.99E-05	744	1.02E-05
410	3.80E-06	477	1.23E-04	544	3.31E-04	611	5.25E-04	678	8.71E-05	745	9.90E-06
411	3.90E-06	478	1.20E-04	545	3.35E-04	612	5.99E-04	679	8.44E-05	746	9.70E-06
412	5.00E-06	479	1.18E-04	546	3.40E-04	613	7.14E-04	680	8.16E-05	747	9.10E-06
413	5.30E-06	480	1.16E-04	547	3.43E-04	614	6.97E-04	681	7.92E-05	748	9.10E-06
414	5.60E-06	481	1.16E-04	548	3.48E-04	615	5.81E-04	682	7.65E-05	749	8.60E-06
415	6.80E-06	482	1.17E-04	549	3.54E-04	616	5.04E-04	683	7.41E-05	750	8.50E-06
416	8.00E-06	483	1.17E-04	550	3.57E-04	617	4.78E-04	684	7.12E-05	751	8.20E-06
417	8.70E-06	484	1.20E-04	551	3.61E-04	618	4.70E-04	685	6.93E-05	752	7.80E-06
418	1.01E-05	485	1.22E-04	552	3.67E-04	619	4.68E-04	686	6.73E-05	753	7.80E-06
419	1.14E-05	486	1.25E-04	553	3.71E-04	620	4.61E-04	687	6.49E-05	754	7.60E-06
420	1.25E-05	487	1.27E-04	554	3.76E-04	621	4.48E-04	688	6.36E-05	755	7.20E-06
421	1.33E-05	488	1.28E-04	555	3.82E-04	622	4.39E-04	689	6.13E-05	756	6.90E-06
422	1.59E-05	489	1.32E-04	556	3.87E-04	623	4.35E-04	690	5.95E-05	757	6.70E-06
423	1.71E-05	490	1.34E-04	557	3.93E-04	624	4.40E-04	691	5.73E-05	758	6.50E-06
424	1.97E-05	491	1.38E-04	558	3.98E-04	625	4.36E-04	692	5.55E-05	759	6.10E-06
425	2.18E-05	492	1.42E-04	559	4.04E-04	626	4.36E-04	693	5.37E-05	760	6.20E-06
426	2.36E-05	493	1.44E-04	560	4.08E-04	627	4.37E-04	694	5.23E-05	761	5.80E-06
427	2.64E-05	494	1.49E-04	561	4.13E-04	628	4.63E-04	695	5.02E-05	762	5.80E-06
428	3.01E-05	495	1.53E-04	562	4.20E-04	629	5.90E-04	696	4.89E-05	763	5.70E-06
429	3.43E-05	496	1.58E-04	563	4.24E-04	630	8.75E-04	697	4.71E-05	764	5.60E-06
430	3.74E-05	497	1.63E-04	564	4.31E-04	631	9.97E-04	698	4.58E-05	765	5.10E-06
431	4.25E-05	498	1.69E-04	565	4.33E-04	632	7.60E-04	699	4.40E-05	766	5.00E-06
432	4.70E-05	499	1.73E-04	566	4.40E-04	633	5.61E-04	700	4.28E-05	767	4.90E-06
433	5.11E-05	500	1.79E-04	567	4.47E-04	634	6.25E-04	701	4.14E-05	768	4.40E-06
434	5.75E-05	501	1.85E-04	568	4.51E-04	635	7.49E-04	702	3.99E-05	769	4.60E-06
435	6.39E-05	502	1.90E-04	569	4.55E-04	636	6.12E-04	703	3.88E-05	770	4.60E-06
436	7.04E-05	503	1.95E-04	570	4.60E-04	637	4.22E-04	704	3.77E-05	771	4.40E-06
437	7.80E-05	504	2.00E-04	571	4.65E-04	638	3.37E-04	705	3.60E-05	772	4.10E-06
438	8.53E-05	505	2.04E-04	572	4.71E-04	639	3.06E-04	706	3.53E-05	773	4.10E-06
439	9.52E-05	506	2.09E-04	573	4.74E-04	640	2.89E-04	707	3.40E-05	774	3.80E-06
440	1.07E-04	507	2.14E-04	574	4.80E-04	641	2.75E-04	708	3.27E-05	775	3.80E-06
441	1.17E-04	508	2.19E-04	575	4.83E-04	642	2.67E-04	709	3.19E-05	776	3.90E-06
442	1.32E-04	509	2.24E-04	576	4.87E-04	643	2.59E-04	710	3.09E-05	777	3.60E-06
443	1.48E-04	510	2.27E-04	577	4.90E-04	644	2.53E-04	711	3.00E-05	778	3.50E-06
444	1.65E-04	511	2.31E-04	578	4.94E-04	645	2.51E-04	712	2.87E-05	779	3.40E-06
445	1.83E-04	512	2.35E-04	579	4.98E-04	646	2.75E-04	713	2.81E-05	780	3.40E-06
446	2.06E-04	513	2.39E-04	580	5.02E-04	647	3.33E-04	714	2.68E-05	N/A	N/A

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	WPX2 @ 60W / 3000K	Sample ID	231101003-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±1°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	120.0	60	0.481	57.5	0.996
NON-WORST CASE	277.0	60	0.224	56.7	0.913

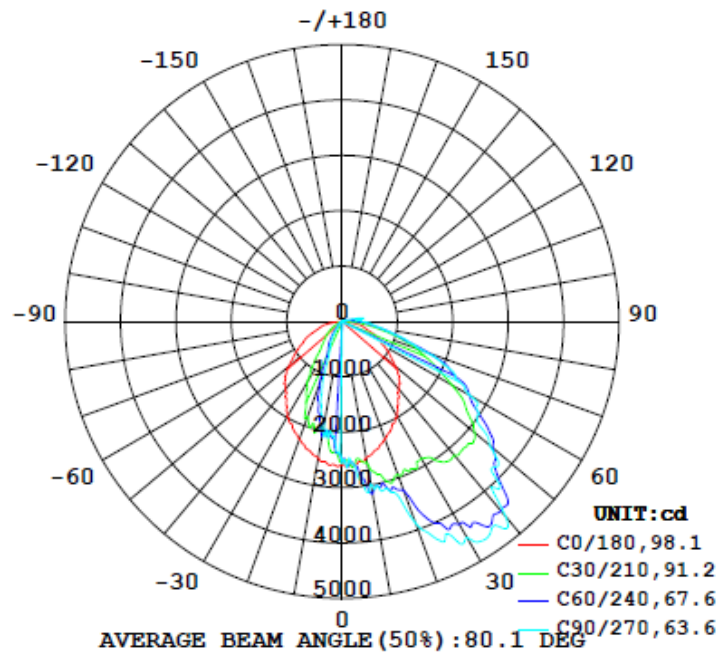
Test Result

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	8052	113.5	147.6	64.9	97.9	140.0	2.7%	B2-U3-G2
0°-90° zones	7852	113.5	147.6	64.9	97.9	136.6	2.8%	B2-U3-G2

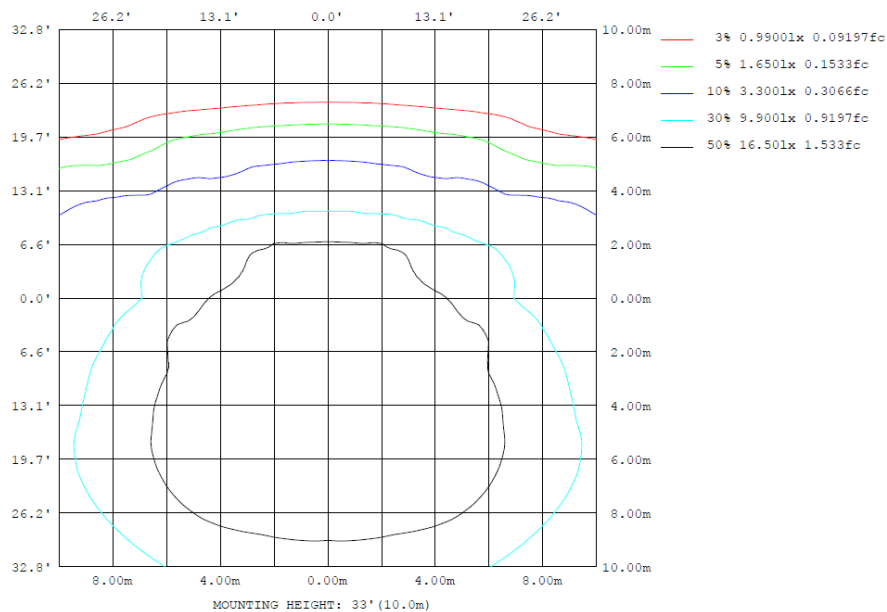
4.2 Goniophotometer Test

Lighting Distribution Curve

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM



Isolux Plot



4.2 Goniophotometer Test

Zonal Lumen Summary

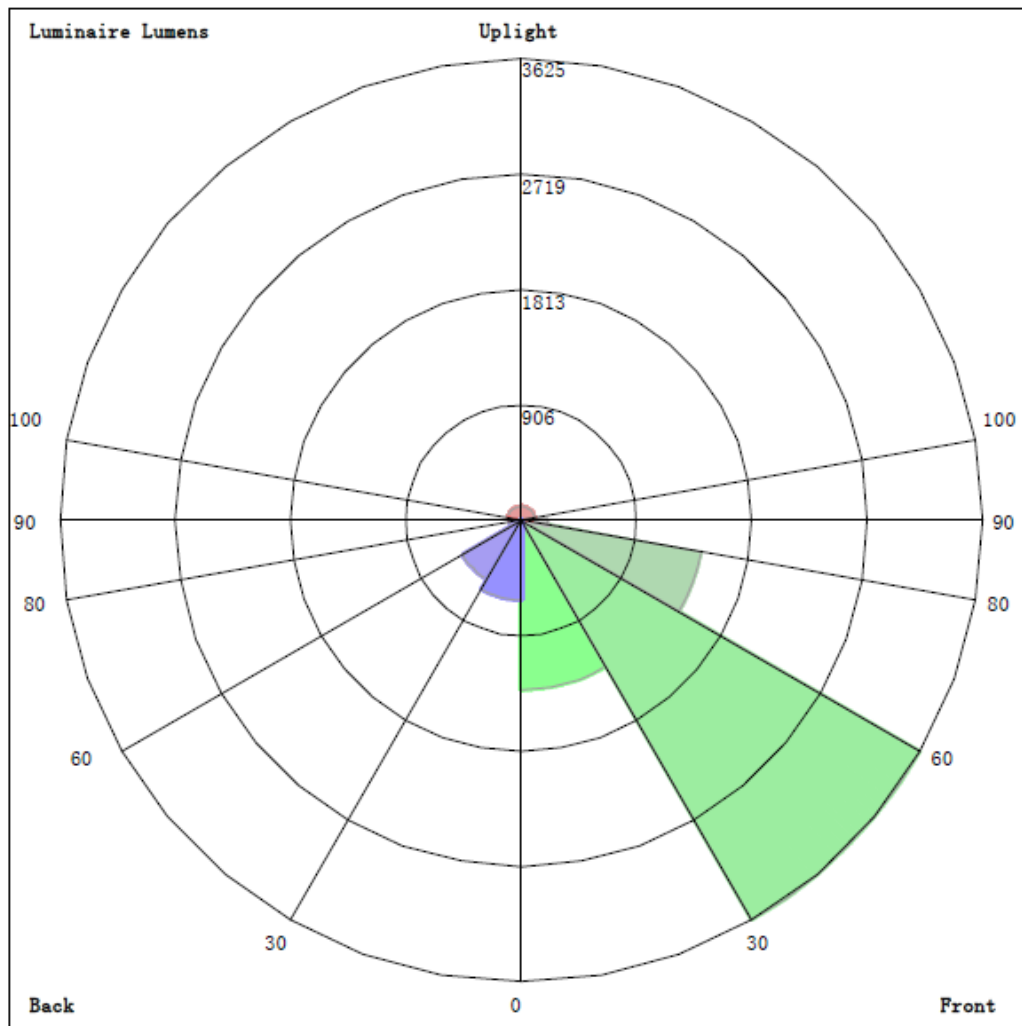
ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	zone	total	%lum, lamp
10	2498	2878	2972	2878	2498	2108	1881	2108	0- 10	234.0	234.0	2.91, 2.91
20	2262	3074	3863	3074	2262	1453	792.7	1453	10- 20	666.5	900.5	11.2, 11.2
30	1990	3784	4499	3784	1990	599.1	379.3	599.1	20- 30	1052	1952	24.2, 24.2
40	1590	4056	4587	4056	1590	352.9	114.0	352.9	30- 40	1383	3335	41.4, 41.4
50	1238	3459	3479	3459	1238	143.5	65.25	143.5	40- 50	1475	4811	59.7, 59.7
60	876.5	2566	2653	2566	876.5	65.05	24.84	65.05	50- 60	1302	6113	75.9, 75.9
70	541.1	1655	1590	1655	541.1	7.931	1.233	7.931	60- 70	986.5	7099	88.2, 88.2
80	284.6	706.7	735.9	706.7	284.6	3.241	1.696	3.241	70- 80	535.9	7635	94.8, 94.8
90	26.70	227.1	373.6	227.1	26.70	2.081	1.938	2.081	80- 90	216.7	7852	97.5, 97.5
100	22.65	95.63	382.8	95.63	22.65	2.669	2.445	2.669	90-100	91.27	7943	98.7, 98.7
110	13.40	20.83	62.50	20.83	13.40	2.079	2.687	2.079	100-110	41.38	7985	99.2, 99.2
120	11.06	63.55	27.52	63.55	11.06	2.025	2.612	2.025	110-120	18.90	8003	99.4, 99.4
130	6.047	53.16	63.24	53.16	6.047	2.178	3.049	2.178	120-130	21.56	8025	99.7, 99.7
140	1.893	32.79	51.55	32.79	1.893	2.413	3.190	2.413	130-140	15.24	8040	99.9, 99.9
150	1.474	15.97	26.94	15.97	1.474	2.726	3.195	2.726	140-150	7.724	8048	100, 100
160	1.522	1.286	10.48	1.286	1.522	2.897	2.851	2.897	150-160	2.695	8051	100, 100
170	1.785	1.694	1.845	1.694	1.785	2.371	2.218	2.371	160-170	0.7171	8051	100, 100
180	2.176	2.104	1.781	2.104	2.176	1.999	1.893	1.999	170-180	0.1944	8052	100, 100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

	Zonal (lm)		Total (lm)	Percent
0-10	234.00	0-10	234.00	2.91%
10-20	666.51	0-20	900.51	11.18%
20-30	1051.83	0-30	1952.34	24.25%
30-40	1383.14	0-40	3335.48	41.43%
40-50	1475.32	0-50	4810.80	59.75%
50-60	1302.05	0-60	6112.85	75.92%
60-70	986.48	0-70	7099.33	88.18%
70-80	535.85	0-80	7635.18	94.83%
80-90	216.72	0-90	7851.90	97.52%
90-100	91.27	0-100	7943.17	98.66%
100-110	41.38	0-110	7984.55	99.17%
110-120	18.90	0-120	8003.45	99.40%
120-130	21.56	0-130	8025.01	99.67%
130-140	15.24	0-140	8040.25	99.86%
140-150	7.72	0-150	8047.97	99.96%
150-160	2.69	0-160	8050.66	99.99%
160-170	0.72	0-170	8051.38	100.00%
170-180	0.19	0-180	8051.57	100.00%

4.2 Goniophotometer Test

LCS/BUG

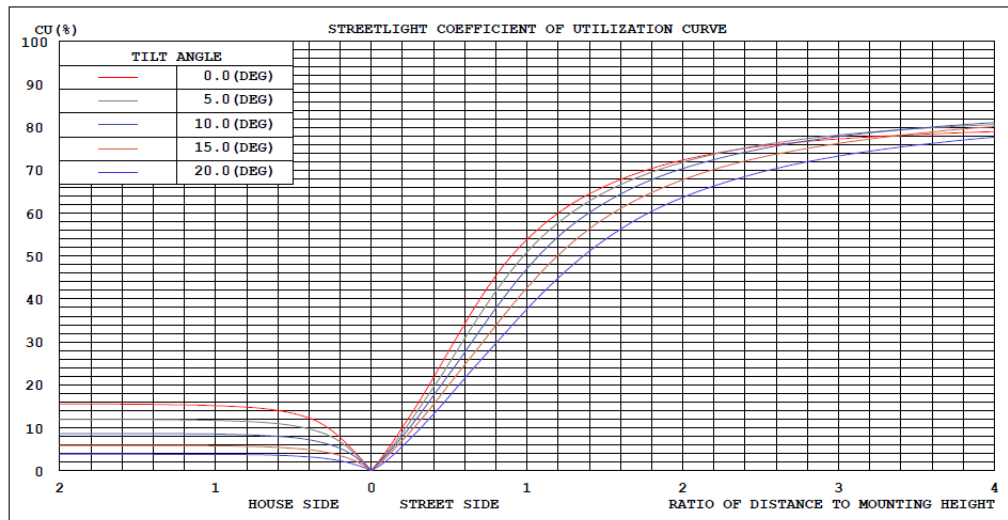


LUMINAIRE CLASSIFICATION SYSTEM (LCS)

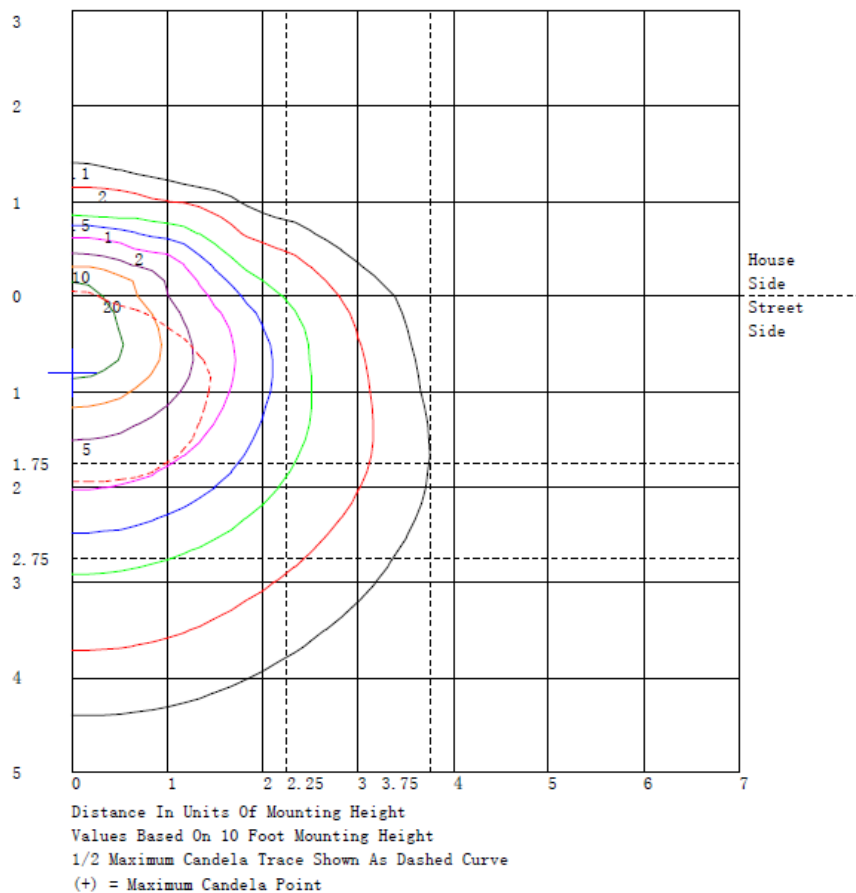
	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	1329.4	N.A.	16.5
FM - Front-Medium (30-60)	3625.5	N.A.	45.0
FH - Front-High (60-80)	1432.6	N.A.	17.8
FVH - Front-Very High (80-90)	206.9	N.A.	2.6
BL - Back-Low (0-30)	622.9	N.A.	7.7
BM - Back-Medium (30-60)	535.0	N.A.	6.6
BH - Back-High (60-80)	89.8	N.A.	1.1
BVH - Back-Very High (80-90)	9.8	N.A.	0.1
UL - Uplight-Low (90-100)	91.3	N.A.	1.1
UH - Uplight-High (100-180)	108.4	N.A.	1.3
Total	8051.6	N.A.	100.0
BUG Rating	B2-U3-G2		

4.2 Goniophotometer Test

Coefficients of Utilization



Isolines



4.2 Goniophotometer Test

Luminous Distribution Intensity Data

Table--1

UNIT: cd

C (DEG)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
γ (DEG)	0	2558	2558	2558	2558	2558	2558	2557	2557	2556	2555	2554	2553	2555	2556	2558	2558	2557	2556
5	2609	2565	2538	2527	2548	2574	2592	2554	2512	2482	2521	2573	2622	2623	2614	2600	2598	2598	2600
10	2498	2478	2472	2480	2498	2533	2586	2672	2772	2878	2994	3094	3163	3141	3090	3030	3000	2981	2972
15	2395	2386	2417	2490	2644	2809	2957	2995	3003	3000	3037	3073	3102	3098	3087	3076	3092	3108	3119
20	2262	2290	2353	2450	2614	2788	2945	3009	3047	3074	3114	3169	3247	3404	3571	3724	3806	3852	3863
25	2123	2271	2414	2551	2684	2810	2930	3015	3113	3242	3499	3771	4018	4128	4194	4235	4303	4355	4383
30	1990	2291	2529	2705	2753	2789	2861	3144	3467	3784	3972	4119	4234	4346	4434	4496	4515	4513	4499
35	1762	2049	2310	2545	2733	2910	3090	3319	3560	3808	4072	4317	4521	4621	4674	4692	4697	4687	4667
40	1590	1892	2178	2446	2682	2913	3153	3467	3776	4056	4232	4364	4463	4564	4639	4684	4667	4629	4587
45	1448	1697	1963	2244	2559	2877	3184	3470	3716	3907	3976	3995	3987	4012	4024	4016	3946	3869	3809
50	1238	1477	1745	2044	2423	2794	3120	3291	3398	3459	3510	3540	3556	3576	3585	3583	3550	3512	3479
55	1048	1266	1509	1777	2109	2437	2731	2916	3045	3123	3151	3145	3116	3080	3039	3000	2986	2977	2968
60	877	1135	1383	1623	1869	2094	2288	2414	2504	2566	2602	2628	2653	2724	2787	2828	2779	2713	2653
65	727	956	1165	1355	1525	1676	1811	1939	2047	2131	2167	2183	2189	2208	2226	2240	2247	2249	2246
70	541	673	812	956	1122	1283	1427	1529	1604	1655	1673	1675	1668	1674	1676	1671	1644	1615	1590
75	405	453	521	608	740	873	991	1037	1059	1065	1074	1081	1088	1108	1128	1144	1142	1134	1123
80	285	288	310	349	419	496	573	629	674	707	718	720	718	723	728	733	736	738	736
85	113	109	119	144	193	250	308	352	392	425	450	469	485	502	515	524	526	524	521
90	26.7	39.2	54.4	72.2	93.2	116	142	170	198	227	255	282	307	328	345	359	368	373	374
95	21.1	28.4	36.2	44.7	53.3	62.9	74.0	87.6	103	121	142	164	187	209	230	248	258	264	266
100	22.7	23.4	25.0	27.3	28.6	32.0	39.1	51.9	70.6	95.6	132	173	217	261	302	338	362	377	383
105	17.0	17.4	17.9	18.5	18.2	18.6	20.6	26.1	33.7	43.0	56.7	69.8	79.9	77.0	72.3	69.7	81.4	95.5	109
110	13.4	10.1	10.3	14.0	25.6	37.4	46.1	38.2	28.3	20.8	30.5	43.4	56.1	58.7	58.8	57.9	59.7	61.4	62.5
115	16.2	10.2	8.46	11.0	21.2	33.2	44.5	49.8	51.6	49.5	38.1	26.0	16.5	21.0	29.3	38.9	45.7	50.4	52.2
120	11.1	6.28	5.57	8.90	18.8	30.9	43.2	51.8	58.6	63.5	67.0	67.8	65.5	55.9	44.8	34.2	29.2	27.0	27.5
125	8.22	4.28	3.94	7.21	16.0	27.0	38.6	48.0	56.4	63.3	68.2	71.3	72.8	71.9	69.7	67.0	64.1	61.7	60.3
130	6.05	3.32	3.39	6.27	13.4	22.2	31.7	39.5	46.7	53.2	59.0	63.7	67.1	67.8	67.3	66.1	64.9	63.8	63.2
135	1.97	0.00	0.00	0.91	7.81	16.3	25.3	31.8	37.8	43.3	49.2	54.5	58.6	59.9	60.1	59.8	59.8	59.8	59.8
140	1.89	3.38	5.39	7.91	11.0	14.6	18.6	23.2	28.0	32.8	37.3	41.3	44.7	46.8	48.3	49.4	50.5	51.2	51.5
145	1.86	2.17	3.07	4.56	6.75	9.45	12.6	16.2	20.0	23.6	26.5	29.1	31.4	33.3	35.0	36.5	38.1	39.3	39.9
150	1.47	1.50	1.51	1.53	0.82	0.65	1.54	5.91	11.0	16.0	18.4	20.1	21.4	22.7	23.8	24.8	25.8	26.5	26.9
155	1.38	1.35	1.41	1.54	1.51	1.74	2.39	4.19	6.36	8.66	10.7	12.5	14.0	15.0	15.7	16.3	16.9	17.4	17.7
160	1.52	1.45	1.43	1.47	1.65	1.82	1.94	1.50	1.20	1.29	2.78	4.61	6.47	7.60	8.50	9.20	9.84	10.3	10.5
165	1.65	1.66	1.66	1.65	1.59	1.56	1.57	1.73	1.95	2.20	2.56	2.85	2.96	2.51	1.95	1.41	1.29	1.30	1.38
170	1.78	1.80	1.80	1.80	1.79	1.78	1.76	1.74	1.72	1.69	1.67	1.66	1.66	1.68	1.71	1.75	1.78	1.81	1.84
175	1.92	1.94	1.95	1.95	1.95	1.94	1.93	1.92	1.91	1.89	1.87	1.85	1.83	1.80	1.78	1.75	1.71	1.68	1.67
180	2.18	2.19	2.19	2.19	2.18	2.17	2.15	2.14	2.13	2.10	2.06	2.02	1.97	1.95	1.92	1.89	1.85	1.81	1.78

UNIT: cd																			
C (DEG)	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
γ (DEG)	0	2557	2558	2558	2556	2555	2553	2554	2555	2556	2557	2557	2558	2558	2558	2558	2558	2558	2560
5	2598	2598	2600	2614	2623	2622	2573	2521	2482	2512	2554	2592	2574	2548	2527	2538	2565	2609	2494
10	2981	3000	3030	3090	3141	3163	3094	2994	2878	2772	2672	2586	2533	2498	2480	2472	2478	2498	2427
15	3108	3092	3076	3087	3098	3102	3073	3037	3000	3003	2995	2957	2809	2644	2490	2417	2386	2395	2207
20	3852	3806	3724	3571	3404	3247	3169	3114	3074	3047	3009	2945	2788	2614	2450	2353	2290	2262	2073
25	4355	4303	4235	4194	4128	4018	3771	3499	3242	3113	3015	2930	2810	2684	2551	2414	2271	2123	2075
30	4513	4515	4496	4434	4346	4234	4119	3972	3784	3467	3144	2861	2789	2753	2705	2529	2291	1990	1938
35	4687	4697	4692	4674	4621	4521	4317	4072	3808	3560	3319	3090	2910	2733	2545	2310	2049	1762	1796
40	4629	4667	4684	4639	4564	4463	4364	4232	4056	3776	3467	3153	2913	2682	2446	2178	1892	1590	1628
45	3869	3946	4016	4024	4012	3987	3995	3976	3907	3716	3470	3184	2877	2559	2244	1963	1697	1448	1408
50	3512	3550	3583	3585	3576	3556	3540	3510	3459	3398	3291	3120	2794	2423	2044	1745	1477	1238	1122
55	2977	2986	3000	3039	3080	3116	3145	3151	3123	3045	2916	2731	2437	2109	1777	1509	1266	1048	870
60	2713	2779	2828	2787	2724	2653	2628	2602	2566	2504	2414	2288	2094	1869	1623	1383	1135	877	663
65	2249	2247	2240	2226	2208	2189	2183	2167	2131	2047	1939	1811	1676	1525	1355	1165	956	727	531
70	1615	1644	1671	1676	1674	1668	1675	1673	1655	1604	1529	1427	1283	1122	956	812	673	541	406
75	1134	1142	1144	1128	1108	1088	1081	1074	1065	1059	1037	991	873	740	608	521	453	405	291
80	738	736	733	728	723	718	720	718	707	674	629	573	496	419	349	310	288	285	194
85	524	526	524	515	502	485	469	450	425	392	352	308	250	193	144	119	109	113	81.3
90	373	368	359	345	328	307	282	255	227	198	170	142	116	93.2	72.2	54.4	39.2	26.7	24.7
95	264	258	248	230	209	187	164	142	121	103	87.6	74.0	62.9	53.3	44.7	36.2	28.4	21.1	18.4
100	377	362	338	302	261	217	173	132	95.6	70.6	51.9	39.1	32.0	28.6	27.3	25.0	23.4	22.7	17.9
105	95.5	81.4	69.7	72.3	77.0	79.9	69.8	56.7	43.0	33.7	26.1	20.6	18.6	18.2	18.5	17.9	17.4	17.0	13.0
110	61.4	59.7	57.9	58.8	58.7	56.1	43.4	30.5	20.8	28.3	38.2	46.1	37.4	25.6	14.0	10.3	10.1	13.4	10.2
115	50.4	45.7	38.9	29.3	21.0	16.5	26.0	38.1	49.5	51.6	49.8	44.5	33.2	21.2	11.0	8.46	10.2	16.2	11.5
120	27.0	29.2	34.2	44.8	55.9	65.5	67.8	67.0	63.5	58.6	51.8	43.2	30.9	18.8	8.90	5.57	6.28	11.1	8.41
125	61.7	64.1	67.0	69.7	71.9	72.8	71.3	68.2	63.3	56.4	48.0	38.6	27.0	16.0	7.21	3.94	4.28	8.22	6.49
130	63.8	64.9	66.1	67.3	67.8	67.1	63.7	59.0	53.2	46.7	39.5	31.7	22.2	13.4	6.27	3.39	3.32	6.05	4.92
135	59.8	59.8	59.8	60.1	59.9	58.6	54.5	49.2	43.3	37.8	31.8	25.3	16.3	7.81	0.91	0.39	0.00	1.97	2.40
140	51.2	50.5	49.4	48.3	46.8	44.7	41.3	37.3	32.8	28.0	23.2	18.6	14.6	11.1	7.91	5.59	3.38	1.89	2.20
145	39.3	38.1	36.5	35.0	33.3	31.4	29.1	26.5	23.6	20.0	16.2	12.6	9.45	6.75	4.56	3.07	2.17	1.86	2.10
150	26.5	25.8	24.8	23.8	22.7	21.4	20.1	18.4	16.0	11.0	5.91	1.54	0.65	0.82	1.53	1.51	1.50	1.47	1.80
155	17.4	16.9	16.3	15.7	15.0	14.0	12.5	10.7	8.66	6.36	4.19	2.39	1.74	1.51	1.54	1.41	1.35	1.38	1.90
160	10.3	9.84	9.20	8.50	7.60	6.47	4.61	2.78	1.29	1.20	1.50	1.94	1.82	1.65	1.47	1.43	1.45	1.52	2.10
165	1.30	1.29	1.41	1.95	2.51	2.96	2.85	2.56	2.20	1.95	1.73	1.57	1.56	1.59	1.65	1.66	1.66	1.65	2.20
170	1.81	1.78	1.75	1.71	1.68	1.66	1.66	1.67	1.69	1.72	1.74	1.76	1.78	1.79	1.80	1.80	1.80	1.78	2.20
175	1.68	1.71	1.75	1.78	1.80	1.83	1.85	1.87	1.89	1.91	1.92	1.93	1.94	1.95	1.95	1.94	1.94	1.92	2.20
180	1.81	1.85	1.89	1.92	1.95	1.97	2.02	2.06	2.10	2.13	2.14	2.15	2.17	2.18	2.19	2.19	2.19	2.18	2.10

Table--3

UNIT: cd

C (DEG) y	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
0	2562	2563	2562	2562	2561	2560	2559	2559	2558	2556	2555	2555	2554	2554	2554	2555	2556	2555	2554
5	2408	2352	2352	2361	2359	2271	2174	2088	2079	2091	2112	2113	2111	2107	2098	2091	2087	2091	2098
10	2355	2283	2196	2118	2060	2062	2081	2108	2119	2121	2109	2064	2009	1955	1920	1895	1881	1895	1920
15	2066	1970	1943	1945	1960	1958	1947	1920	1850	1768	1681	1601	1533	1484	1481	1493	1510	1493	1481
20	1931	1835	1824	1830	1825	1717	1587	1453	1368	1291	1215	1116	1019	931	864	817	793	817	864
25	2005	1915	1797	1664	1519	1372	1221	1067	898	744	617	569	550	548	534	525	520	525	534
30	1858	1750	1611	1447	1261	1024	794	599	527	496	488	456	429	406	392	383	379	383	392
35	1757	1644	1405	1132	863	699	573	480	413	366	332	296	267	245	230	221	218	221	230
40	1582	1453	1170	857	566	451	388	353	291	237	192	161	140	126	117	114	114	114	117
45	1317	1176	936	681	448	337	269	228	180	144	119	107	103	102	98.1	95.2	93.7	95.2	98.1
50	993	852	678	507	353	257	189	143	115	99.9	92.4	82.3	74.9	69.9	66.9	65.4	65.2	65.4	66.9
55	710	569	444	338	251	186	137	103	80.3	66.4	59.0	53.5	50.9	50.0	48.4	47.4	46.9	47.4	48.4
60	487	349	261	201	160	119	88.0	65.0	50.3	41.3	36.4	32.7	30.6	29.6	27.6	26.0	24.8	26.0	27.6
65	371	248	173	125	96.8	69.0	48.9	34.6	21.8	12.4	5.90	2.46	0.95	0.73	0.47	0.61	0.96	0.61	0.47
70	293	202	137	91.0	58.6	33.9	17.6	7.93	2.48	0.52	0.71	0.29	0.42	0.85	0.96	1.10	1.23	1.10	0.96
75	197	124	77.4	46.8	28.4	15.1	7.82	4.71	2.01	0.93	0.87	0.63	0.70	0.95	1.11	1.29	1.48	1.29	1.11
80	122	67.7	38.3	22.6	15.9	8.75	4.88	3.24	1.76	1.14	1.07	0.91	0.94	1.09	1.27	1.49	1.70	1.49	1.27
85	55.3	35.1	22.6	14.7	10.1	6.09	3.65	2.35	1.53	1.24	1.27	1.18	1.19	1.27	1.43	1.62	1.81	1.62	1.43
90	22.2	19.2	15.0	10.8	6.90	4.63	3.06	2.08	1.59	1.44	1.50	1.45	1.46	1.53	1.64	1.79	1.94	1.79	1.64
95	15.7	13.1	10.3	7.72	5.46	3.93	2.83	2.10	1.77	1.68	1.73	1.70	1.72	1.77	1.86	1.97	2.09	1.97	1.86
100	13.9	10.6	8.03	6.08	4.65	3.67	3.04	2.67	2.44	2.33	2.31	2.23	2.19	2.18	2.23	2.32	2.45	2.32	2.23
105	9.67	6.87	4.60	2.91	1.83	1.76	2.09	2.57	2.61	2.59	2.54	2.51	2.48	2.48	2.53	2.61	2.72	2.61	2.53
110	7.56	5.53	4.27	3.47	2.98	2.52	2.22	2.08	2.14	2.30	2.48	2.54	2.58	2.60	2.63	2.65	2.69	2.65	2.63
115	7.77	5.01	3.55	2.81	2.54	2.23	2.09	2.08	2.11	2.18	2.28	2.31	2.34	2.37	2.41	2.45	2.49	2.45	2.41
120	6.23	4.52	3.38	2.64	2.21	1.99	1.95	2.02	2.10	2.20	2.31	2.37	2.42	2.46	2.52	2.57	2.61	2.57	2.52
125	5.04	3.87	3.04	2.47	2.12	1.98	1.98	2.07	2.18	2.31	2.44	2.50	2.55	2.60	2.67	2.74	2.79	2.74	2.67
130	3.98	3.22	2.65	2.26	2.03	1.99	2.05	2.18	2.26	2.36	2.47	2.58	2.70	2.80	2.91	2.99	3.05	2.99	2.91
135	2.77	2.88	2.66	2.35	2.06	2.07	2.16	2.29	2.40	2.52	2.63	2.73	2.81	2.89	2.97	3.04	3.09	3.04	2.97
140	2.44	2.55	2.47	2.34	2.21	2.24	2.31	2.41	2.49	2.58	2.66	2.76	2.86	2.95	3.05	3.13	3.19	3.13	3.05
145	2.29	2.41	2.44	2.43	2.41	2.45	2.50	2.57	2.66	2.75	2.84	2.90	2.95	3.01	3.10	3.18	3.25	3.18	3.10
150	2.20	2.42	2.52	2.55	2.56	2.61	2.67	2.73	2.78	2.83	2.87	2.91	2.94	2.99	3.06	3.14	3.20	3.14	3.06
155	2.42	2.73	2.85	2.87	2.83	2.81	2.79	2.76	2.78	2.81	2.85	2.91	2.97	3.02	3.02	3.01	3.00	3.01	3.02
160	2.67	3.00	3.11	3.10	3.03	2.99	2.94	2.90	2.90	2.90	2.90	2.87	2.83	2.80	2.81	2.83	2.85	2.83	2.81
165	2.77	3.08	3.15	3.10	2.99	2.94	2.88	2.83	2.81	2.78	2.75	2.66	2.57	2.49	2.51	2.55	2.59	2.55	2.51
170	2.64	2.86	2.88	2.81	2.68	2.58	2.47	2.37	2.33	2.31	2.30	2.27	2.24	2.22	2.21	2.22	2.22	2.22	2.21
175	2.49	2.64	2.66	2.62	2.52	2.39	2.25	2.13	2.12	2.13	2.14	2.08	2.02	1.97	1.98	2.01	2.05	2.01	1.98
180	2.16	2.15	2.14	2.13	2.11	2.08	2.04	2.00	1.95	1.91	1.87	1.84	1.82	1.81	1.83	1.86	1.89	1.86	1.83

C (DEG)																UNIT: cd			
y (DEG)	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355				
0	2554	2554	2555	2555	2556	2558	2559	2559	2560	2561	2562	2562	2563	2562	2560				
5	2107	2111	2113	2112	2091	2079	2088	2174	2271	2359	2361	2352	2352	2408	2494				
10	1955	2009	2064	2109	2121	2119	2108	2081	2062	2060	2118	2196	2283	2355	2427				
15	1484	1533	1601	1681	1768	1850	1920	1947	1958	1960	1945	1943	1970	2066	2207				
20	931	1019	1116	1215	1291	1368	1453	1587	1717	1825	1830	1824	1835	1931	2073				
25	548	550	569	617	744	898	1067	1221	1372	1519	1664	1797	1915	2005	2075				
30	406	429	456	488	496	527	599	794	1024	1261	1447	1611	1750	1858	1938				
35	245	267	296	332	366	413	480	573	699	863	1132	1405	1644	1757	1796				
40	126	140	161	192	237	291	353	388	451	566	857	1170	1453	1582	1628				
45	102	103	107	119	144	180	228	269	337	448	681	936	1176	1317	1408				
50	69.9	74.9	82.3	92.4	99.9	115	143	189	257	353	507	678	852	993	1122				
55	50.5	50.5	53.5	59.0	66.4	80.3	103	137	186	251	338	444	569	710	870				
60	29.6	30.6	32.7	36.4	41.3	50.3	65.0	88.0	119	160	201	261	349	487	663				
65	0.73	0.95	2.46	5.90	12.4	21.8	34.6	48.9	69.0	96.8	125	173	248	371	531				
70	0.85	0.42	0.29	0.71	0.52	2.48	7.93	17.6	33.9	58.6	91.0	137	202	293	406				
75	0.95	0.70	0.63	0.87	0.93	2.01	4.71	7.82	15.1	28.4	46.8	77.4	124	197	291				
80	1.09	0.94	0.91	1.07	1.14	1.76	3.24	4.88	8.75	15.9	22.6	38.3	67.7	122	194				
85	1.27	1.19	1.18	1.27	1.24	1.53	2.35	3.65	6.09	10.1	14.7	22.6	35.1	55.3	81.3				
90	1.53	1.46	1.45	1.50	1.44	1.59	2.08	3.06	4.63	6.90	10.8	15.0	19.2	22.2	24.7				
95	1.77	1.72	1.70	1.73	1.68	1.77	2.10	2.83	3.93	5.46	7.72	10.3	13.1	15.7	18.4				
100	2.18	2.19	2.23	2.31	2.33	2.44	2.67	3.04	3.67	4.65	6.08	8.03	10.6	13.9	17.9				
105	2.48	2.48	2.51	2.54	2.59	2.61	2.57	2.09	1.76	1.83	2.91	4.60	6.87	9.67	13.0				
110	2.60	2.58	2.54	2.48	2.30	2.14	2.08	2.22	2.52	2.98	3.47	4.27	5.53	7.56	10.2				
115	2.37	2.34	2.31	2.28	2.18	2.11	2.08	2.09	2.23	2.54	2.81	3.55	5.01	7.77	11.5				
120	2.46	2.42	2.37	2.31	2.20	2.10	2.02	1.95	1.99	2.21	2.64	3.38	4.52	6.23	8.41				
125	2.60	2.55	2.50	2.44	2.31	2.18	2.07	1.98	1.98	2.12	2.47	3.04	3.87	5.04	6.49				
130	2.80	2.70	2.58	2.47	2.36	2.26	2.18	2.05	1.99	2.03	2.26	2.65	3.22	3.98	4.92				
135	2.89	2.81	2.73	2.63	2.52	2.40	2.29	2.16	2.07	2.06	2.35	2.66	2.88	2.77	2.47				
140	2.95	2.86	2.76	2.66	2.58	2.49	2.41	2.31	2.24	2.21	2.34	2.47	2.55	2.44	2.22				
145	3.01	2.95	2.90	2.84	2.75	2.66	2.57	2.50	2.45	2.41	2.43	2.44	2.41	2.29	2.11				
150	2.99	2.94	2.91	2.87	2.83	2.78	2.73	2.67	2.61	2.56	2.55	2.52	2.42	2.20	1.88				
155	3.02	2.97	2.91	2.85	2.81	2.78	2.76	2.79	2.81	2.83	2.87	2.85	2.73	2.42	1.97				
160	2.80	2.83	2.87	2.90	2.90	2.90	2.90	2.94	2.99	3.03	3.10	3.11	3.00	2.67	1.18				
165	2.49	2.57	2.66	2.75	2.78	2.81	2.83	2.88	2.94	2.99	3.10	3.15	3.08	2.77	2.29				
170	2.22	2.24	2.27	2.30	2.31	2.33	2.37	2.47	2.58	2.68	2.81	2.88	2.86	2.64	2.28				
175	1.97	2.02	2.08	2.14	2.13	2.12	2.13	2.25	2.39	2.52	2.62	2.66	2.64	2.49	2.25				
180	1.81	1.82	1.84	1.87	1.91	1.95	2.00	2.04	2.08	2.11	2.13	2.14	2.15	2.16	2.17				

4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	WPX2 @ 60W / 3000K	Sample ID	231101003-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	0.481	57.5	0.996	2.11
277.0	60	0.224	56.7	0.913	10.31

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*****