

Photometric Test Report

Relevant Standards

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

Prepared For

RAB Lighting Inc.

Prepared By

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Issue Date: 2023-11-16

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		8248
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		139.3
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	300		8039
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	Standard	Premium	135.8
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		59.2
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2014	20.00%	480V	10.08
Power Factor (THD & PF – Section 4.3)	ANSI C82.77:2014	0.9	480V	0.864
Allowable CCTs* (K) (Integrating Sphere – Section 4.1)	IES LM-79-2008	7 steps	3045±175	3110
		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%		2.9%
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		0.143
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		59.2
(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	2023-11-08	WPX2 @ 60W / 3000K 480	231101004-S1
2	Goniophotometer Test	2023-11-08	WPX2 @ 60W / 3000K 480	231101004-S1
3	THD and PF Test	2023-11-08	WPX2 @ 60W / 3000K 480	231101004-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 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

Model No.	WPX2 @ 60W / 3000K 480	Sample ID	231101004-S1
Operate time (Min.)	10	Stabilization time (Min.)	60
Temperature (°C)	25.4	Humidity (%RH)	41.0

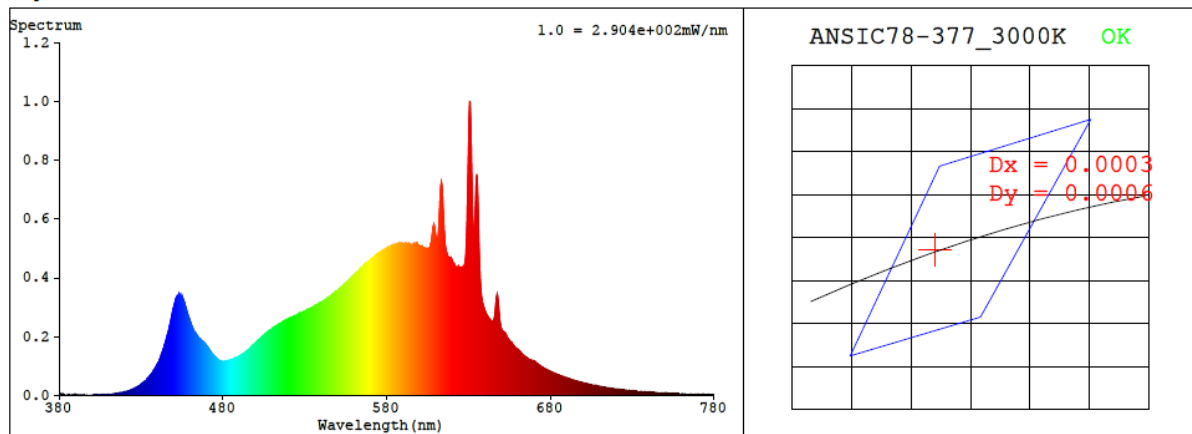
Test Method
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were made using 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
480.0	60	0.143	59.2	0.864

CCT (K)	CRI	R9	Duv	Rf	Rg	IES Rcs,h1
3110	82.4	9	0.0002	84	95	-12%

4.1 Integrating Sphere Test



Colorimetric Parameters

Chromaticity Coordinate: $x = 0.4296$ $y = 0.4019$ / $u' = 0.2468$ $v' = 0.5194$ ($duv=1.96e-04$)

CCT= 3110K Prcp WL: Ld=582.3nm Purity=49.6%

Peak WL: Lp=631nm FWHM: =8.3nm Ratio:R=22.2% G=75.0% B=2.7%

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

EEI: 0.09960 A++ Highest

R1 =81 R2 =91 R3 =96 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

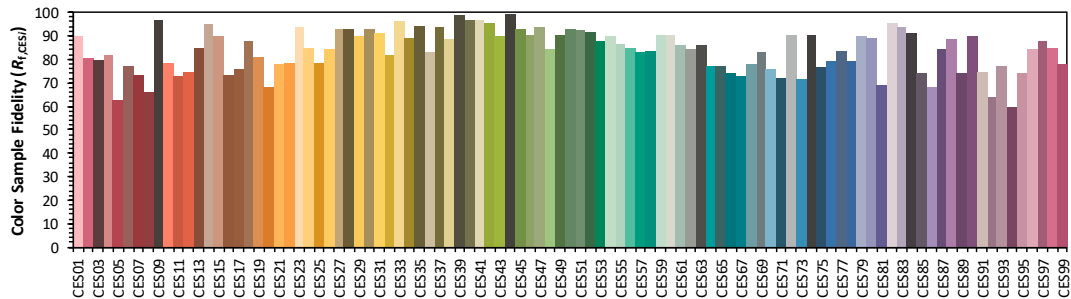
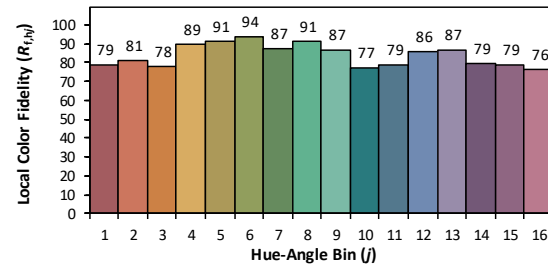
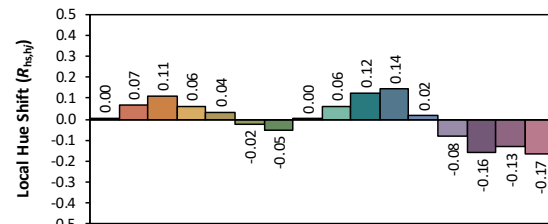
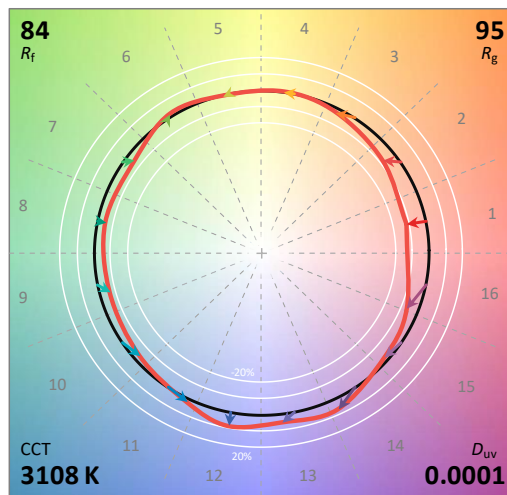
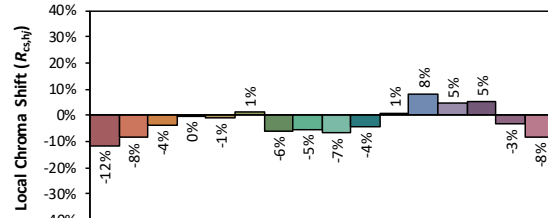
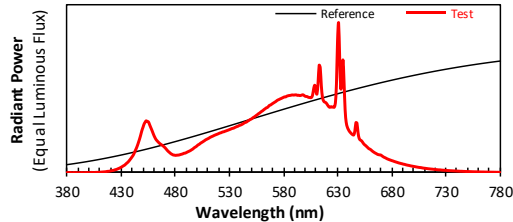
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2023/11/16

Model: WPX2 @ 60W / 3000K 480



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

x 0.4296
 y 0.4018
 u' 0.2468
 v' 0.5194

CIE 13.3-1995
(CRI)

R_a 82
 R_g 9

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	3.00E-06	447	2.28E-04	514	2.42E-04	581	5.04E-04	648	3.29E-04	715	2.62E-05
381	2.00E-06	448	2.54E-04	515	2.45E-04	582	5.04E-04	649	2.65E-04	716	2.52E-05
382	1.10E-06	449	2.81E-04	516	2.49E-04	583	5.09E-04	650	2.29E-04	717	2.46E-05
383	2.20E-06	450	3.02E-04	517	2.52E-04	584	5.11E-04	651	2.18E-04	718	2.39E-05
384	0.00E+00	451	3.23E-04	518	2.55E-04	585	5.13E-04	652	2.14E-04	719	2.30E-05
385	2.00E-07	452	3.36E-04	519	2.57E-04	586	5.14E-04	653	2.05E-04	720	2.22E-05
386	2.10E-06	453	3.45E-04	520	2.60E-04	587	5.15E-04	654	1.95E-04	721	2.14E-05
387	3.00E-07	454	3.40E-04	521	2.64E-04	588	5.17E-04	655	1.87E-04	722	2.08E-05
388	1.30E-06	455	3.39E-04	522	2.66E-04	589	5.16E-04	656	1.81E-04	723	1.99E-05
389	4.00E-07	456	3.22E-04	523	2.69E-04	590	5.17E-04	657	1.74E-04	724	1.95E-05
390	4.00E-07	457	3.04E-04	524	2.72E-04	591	5.17E-04	658	1.67E-04	725	1.93E-05
391	1.10E-06	458	2.87E-04	525	2.73E-04	592	5.17E-04	659	1.60E-04	726	1.83E-05
392	2.00E-07	459	2.69E-04	526	2.76E-04	593	5.14E-04	660	1.57E-04	727	1.76E-05
393	1.70E-06	460	2.51E-04	527	2.79E-04	594	5.15E-04	661	1.52E-04	728	1.72E-05
394	1.20E-06	461	2.35E-04	528	2.81E-04	595	5.13E-04	662	1.45E-04	729	1.65E-05
395	4.00E-07	462	2.22E-04	529	2.84E-04	596	5.14E-04	663	1.40E-04	730	1.63E-05
396	1.10E-06	463	2.13E-04	530	2.87E-04	597	5.16E-04	664	1.35E-04	731	1.55E-05
397	1.60E-06	464	2.05E-04	531	2.90E-04	598	5.18E-04	665	1.31E-04	732	1.49E-05
398	9.00E-07	465	1.98E-04	532	2.93E-04	599	5.14E-04	666	1.27E-04	733	1.45E-05
399	1.70E-06	466	1.92E-04	533	2.95E-04	600	5.09E-04	667	1.23E-04	734	1.41E-05
400	1.20E-06	467	1.87E-04	534	2.97E-04	601	5.07E-04	668	1.20E-04	735	1.37E-05
401	7.00E-07	468	1.82E-04	535	3.01E-04	602	5.06E-04	669	1.19E-04	736	1.33E-05
402	2.40E-06	469	1.76E-04	536	3.04E-04	603	5.02E-04	670	1.18E-04	737	1.29E-05
403	2.40E-06	470	1.69E-04	537	3.07E-04	604	5.00E-04	671	1.13E-04	738	1.25E-05
404	1.70E-06	471	1.62E-04	538	3.10E-04	605	4.99E-04	672	1.08E-04	739	1.23E-05
405	1.80E-06	472	1.53E-04	539	3.14E-04	606	5.01E-04	673	1.03E-04	740	1.16E-05
406	2.50E-06	473	1.45E-04	540	3.16E-04	607	5.19E-04	674	1.00E-04	741	1.14E-05
407	2.90E-06	474	1.38E-04	541	3.19E-04	608	5.61E-04	675	9.64E-05	742	1.10E-05
408	3.00E-06	475	1.32E-04	542	3.23E-04	609	5.81E-04	676	9.25E-05	743	1.06E-05
409	2.80E-06	476	1.26E-04	543	3.28E-04	610	5.43E-04	677	8.97E-05	744	1.00E-05
410	3.80E-06	477	1.22E-04	544	3.33E-04	611	5.24E-04	678	8.68E-05	745	1.02E-05
411	4.40E-06	478	1.18E-04	545	3.35E-04	612	5.99E-04	679	8.43E-05	746	9.30E-06
412	5.00E-06	479	1.18E-04	546	3.38E-04	613	7.14E-04	680	8.14E-05	747	9.30E-06
413	5.60E-06	480	1.16E-04	547	3.44E-04	614	6.97E-04	681	7.93E-05	748	8.80E-06
414	6.10E-06	481	1.17E-04	548	3.48E-04	615	5.80E-04	682	7.67E-05	749	8.50E-06
415	6.70E-06	482	1.17E-04	549	3.53E-04	616	5.04E-04	683	7.41E-05	750	8.60E-06
416	7.70E-06	483	1.18E-04	550	3.56E-04	617	4.79E-04	684	7.18E-05	751	8.00E-06
417	9.40E-06	484	1.20E-04	551	3.61E-04	618	4.70E-04	685	6.96E-05	752	8.00E-06
418	9.70E-06	485	1.22E-04	552	3.67E-04	619	4.67E-04	686	6.71E-05	753	7.70E-06
419	1.09E-05	486	1.24E-04	553	3.71E-04	620	4.59E-04	687	6.49E-05	754	7.40E-06
420	1.25E-05	487	1.26E-04	554	3.77E-04	621	4.48E-04	688	6.31E-05	755	7.00E-06
421	1.38E-05	488	1.30E-04	555	3.82E-04	622	4.39E-04	689	6.11E-05	756	6.90E-06
422	1.53E-05	489	1.31E-04	556	3.87E-04	623	4.35E-04	690	5.95E-05	757	6.60E-06
423	1.68E-05	490	1.34E-04	557	3.93E-04	624	4.39E-04	691	5.71E-05	758	6.60E-06
424	1.97E-05	491	1.38E-04	558	3.97E-04	625	4.36E-04	692	5.60E-05	759	6.30E-06
425	2.15E-05	492	1.41E-04	559	4.04E-04	626	4.37E-04	693	5.37E-05	760	6.30E-06
426	2.39E-05	493	1.44E-04	560	4.09E-04	627	4.36E-04	694	5.19E-05	761	6.10E-06
427	2.72E-05	494	1.48E-04	561	4.14E-04	628	4.63E-04	695	5.02E-05	762	5.70E-06
428	3.01E-05	495	1.53E-04	562	4.20E-04	629	5.89E-04	696	4.90E-05	763	5.50E-06
429	3.37E-05	496	1.57E-04	563	4.25E-04	630	8.74E-04	697	4.72E-05	764	5.40E-06
430	3.77E-05	497	1.64E-04	564	4.31E-04	631	9.96E-04	698	4.55E-05	765	5.40E-06
431	4.22E-05	498	1.69E-04	565	4.34E-04	632	7.58E-04	699	4.43E-05	766	5.10E-06
432	4.67E-05	499	1.73E-04	566	4.40E-04	633	5.60E-04	700	4.29E-05	767	4.90E-06
433	5.08E-05	500	1.79E-04	567	4.48E-04	634	6.26E-04	701	4.16E-05	768	4.90E-06
434	5.75E-05	501	1.86E-04	568	4.50E-04	635	7.50E-04	702	4.03E-05	769	4.50E-06
435	6.40E-05	502	1.89E-04	569	4.55E-04	636	6.09E-04	703	3.88E-05	770	4.40E-06
436	7.02E-05	503	1.95E-04	570	4.60E-04	637	4.21E-04	704	3.75E-05	771	4.30E-06
437	7.81E-05	504	2.00E-04	571	4.65E-04	638	3.36E-04	705	3.62E-05	772	4.30E-06
438	8.74E-05	505	2.04E-04	572	4.69E-04	639	3.05E-04	706	3.52E-05	773	4.10E-06
439	9.68E-05	506	2.09E-04	573	4.74E-04	640	2.88E-04	707	3.47E-05	774	4.10E-06
440	1.07E-04	507	2.14E-04	574	4.80E-04	641	2.75E-04	708	3.32E-05	775	3.90E-06
441	1.17E-04	508	2.19E-04	575	4.84E-04	642	2.67E-04	709	3.18E-05	776	3.80E-06
442	1.32E-04	509	2.23E-04	576	4.87E-04	643	2.59E-04	710	3.07E-05	777	3.50E-06
443	1.49E-04	510	2.26E-04	577	4.91E-04	644	2.53E-04	711	2.99E-05	778	3.60E-06
444	1.65E-04	511	2.30E-04	578	4.94E-04	645	2.52E-04	712	2.88E-05	779	3.30E-06
445	1.84E-04	512	2.35E-04	579	4.98E-04	646	2.76E-04	713	2.79E-05	780	3.30E-06
446	2.05E-04	513	2.38E-04	580	5.01E-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 480	Sample ID	231101004-S1
Operate time (Min.)	30	Stabilization time (Min.)	60
Temperature (°C)	25.0	Humidity (%RH)	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 $25 \pm 1^{\circ}\text{C}$, measured at a point not more than 1 m from the sample and at the same height as the sample.</p> <p>The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ± 0.2 percent under load.</p> <p>The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1.0° vertical intervals and 15° horizontal intervals.</p>

Test Conditions

Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
WORST CASE	480.0	60	0.143	59.2	0.864
NON-WORST CASE	N/A	N/A	N/A	N/A	N/A

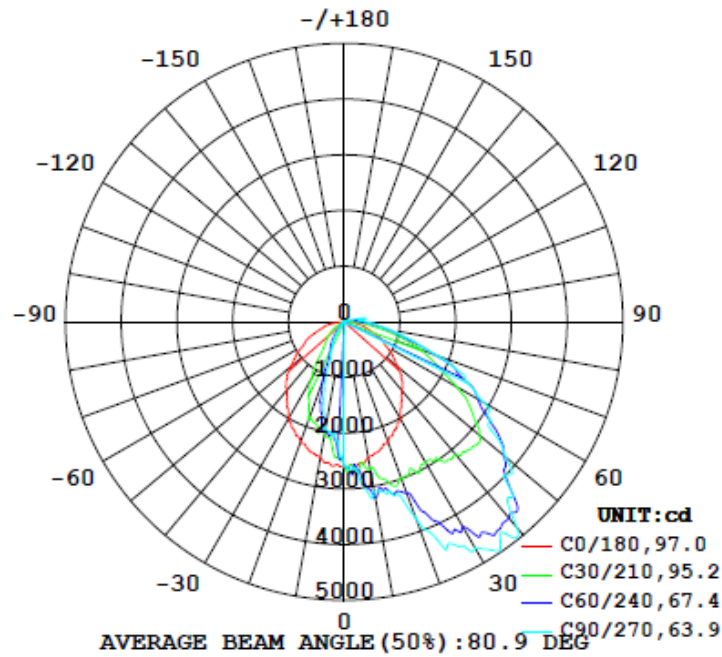
Test Result

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°)	
0°-180° zones	8248	113.9	147.0	64.9	96.7	139.3	2.8%	B2-U3-G2
0°-90° zones	8039	113.9	147.0	64.9	96.7	135.8	2.9%	B2-U3-G2

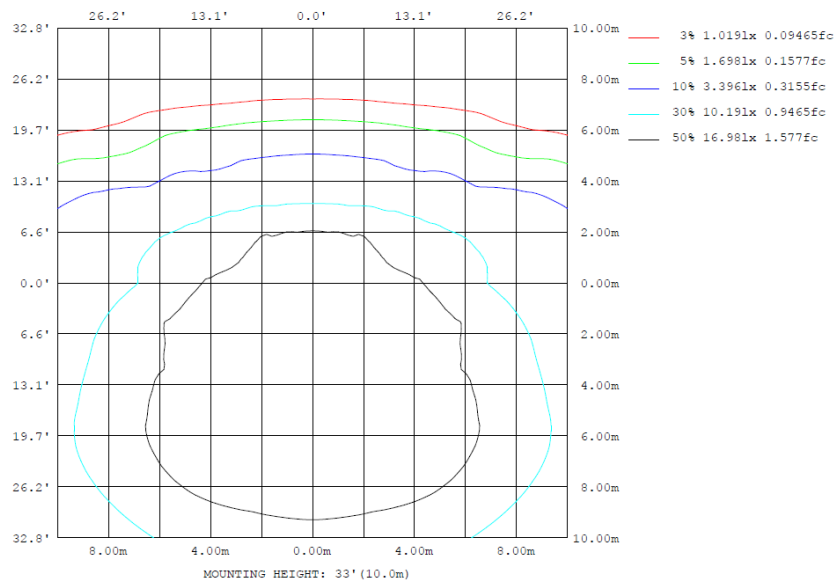
4.2 Goniophotometer Test

Lighting Distribution Curve

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM



Isolux Plot



4.2 Goniophotometer Test

Zonal Lumen Summary

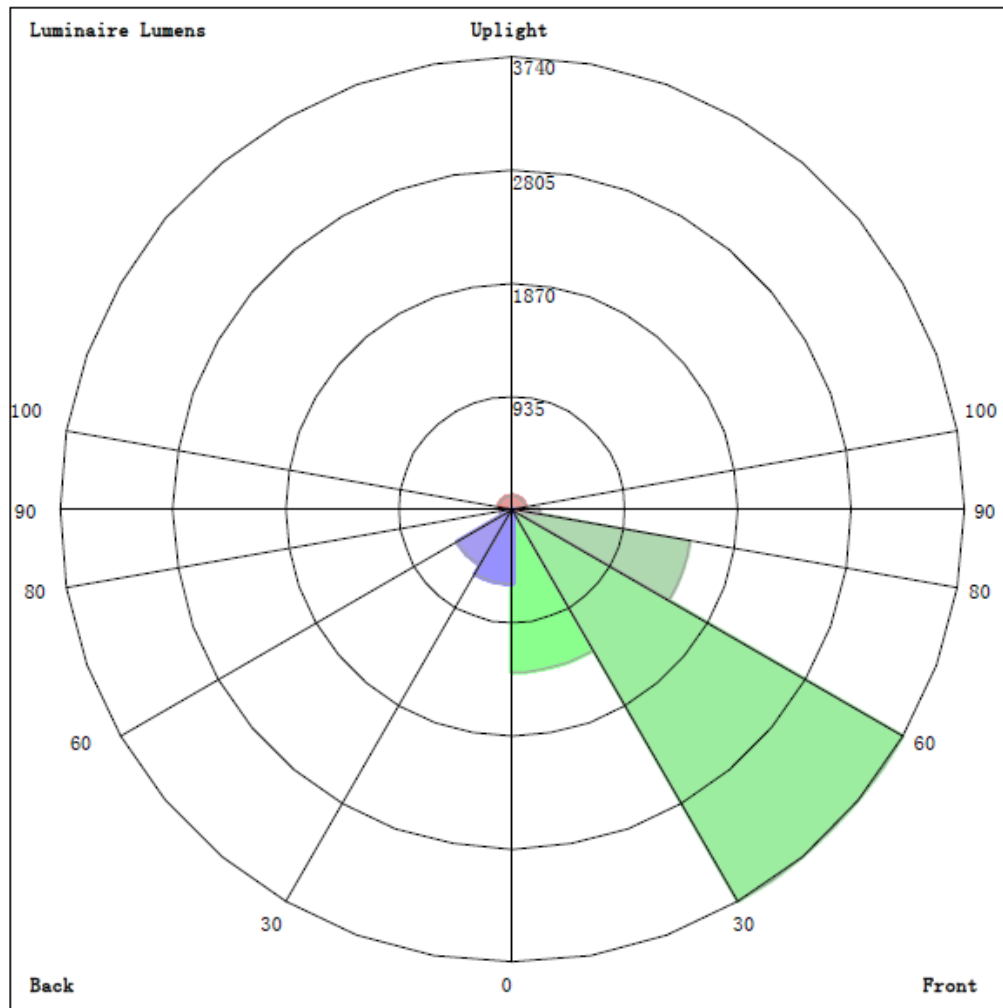
ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	lum, lamp
10	2476	2956	3095	2956	2476	2005	1947	2005	0- 10	236.1	236.1	2.86,2.86
20	2304	3169	3751	3169	2304	1510	742.7	1510	10- 20	666.8	902.9	10.9,10.9
30	1994	3823	4683	3823	1994	589.5	375.0	589.5	20- 30	1055	1957	23.7,23.7
40	1605	4156	4824	4156	1605	346.5	119.0	346.5	30- 40	1405	3363	40.8,40.8
50	1256	3617	3765	3617	1256	143.8	66.90	143.8	40- 50	1519	4882	59.2,59.2
60	856.0	2687	2888	2687	856.0	62.45	20.09	62.45	50- 60	1341	6223	75.4,75.4
70	527.5	1723	1777	1723	527.5	7.768	1.299	7.768	60- 70	1021	7243	87.8,87.8
80	279.8	756.0	840.3	756.0	279.8	3.317	1.818	3.317	70- 80	562.7	7806	94.6,94.6
90	26.55	241.0	410.3	241.0	26.55	2.225	1.965	2.225	80- 90	233.1	8039	97.5,97.5
100	22.79	101.8	405.2	101.8	22.79	2.806	2.519	2.806	90-100	96.06	8135	98.6,98.6
110	14.63	23.43	62.79	23.43	14.63	2.261	2.823	2.261	100-110	44.94	8180	99.2,99.2
120	11.15	64.99	26.23	64.99	11.15	2.189	2.766	2.189	110-120	19.72	8200	99.4,99.4
130	6.300	54.37	63.00	54.37	6.300	2.305	3.225	2.305	120-130	21.67	8221	99.7,99.7
140	1.968	33.63	51.89	33.63	1.968	2.529	3.297	2.529	130-140	15.38	8237	99.9,99.9
150	1.295	16.62	28.00	16.62	1.295	2.851	3.312	2.851	140-150	7.853	8245	100,100
160	1.572	1.305	11.23	1.305	1.572	2.968	2.948	2.968	150-160	2.805	8247	100,100
170	1.815	1.664	2.018	1.664	1.815	2.305	2.248	2.305	160-170	0.7371	8248	100,100
180	2.213	2.139	1.826	2.139	2.213	2.030	1.933	2.030	170-180	0.1954	8248	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

Zonal (lm)		Total (lm)		Percent
0-10	236.12	0-10	236.12	2.86%
10-20	666.76	0-20	902.88	10.95%
20-30	1054.58	0-30	1957.46	23.73%
30-40	1405.29	0-40	3362.75	40.77%
40-50	1519.18	0-50	4881.93	59.19%
50-60	1340.72	0-60	6222.65	75.44%
60-70	1020.57	0-70	7243.22	87.82%
70-80	562.65	0-80	7805.87	94.64%
80-90	233.09	0-90	8038.96	97.46%
90-100	96.05	0-100	8135.01	98.63%
100-110	44.94	0-110	8179.95	99.17%
110-120	19.72	0-120	8199.67	99.41%
120-130	21.67	0-130	8221.34	99.68%
130-140	15.38	0-140	8236.72	99.86%
140-150	7.85	0-150	8244.57	99.96%
150-160	2.81	0-160	8247.38	99.99%
160-170	0.74	0-170	8248.12	100.00%
170-180	0.20	0-180	8248.32	100.00%

4.2 Goniophotometer Test

LCS/BUG

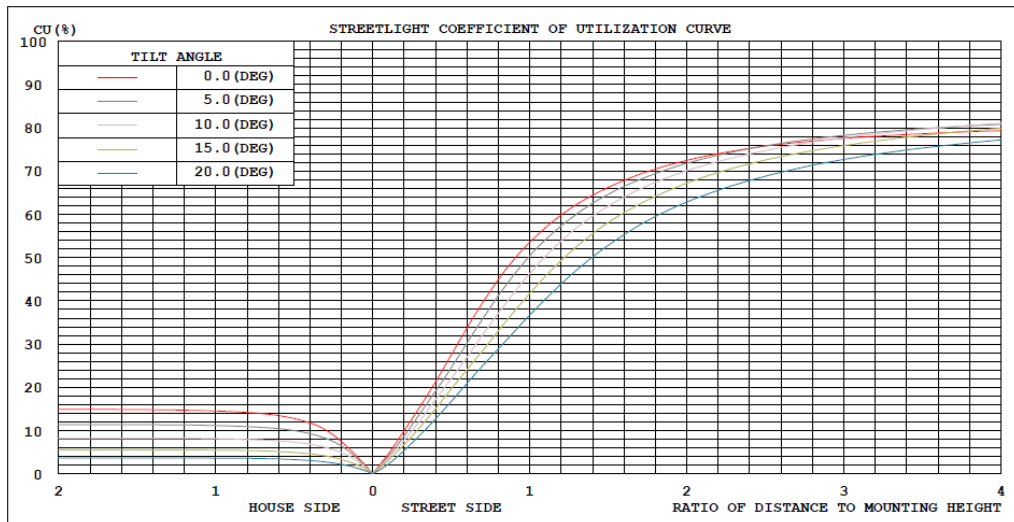


LUMINAIRE CLASSIFICATION SYSTEM (LCS)

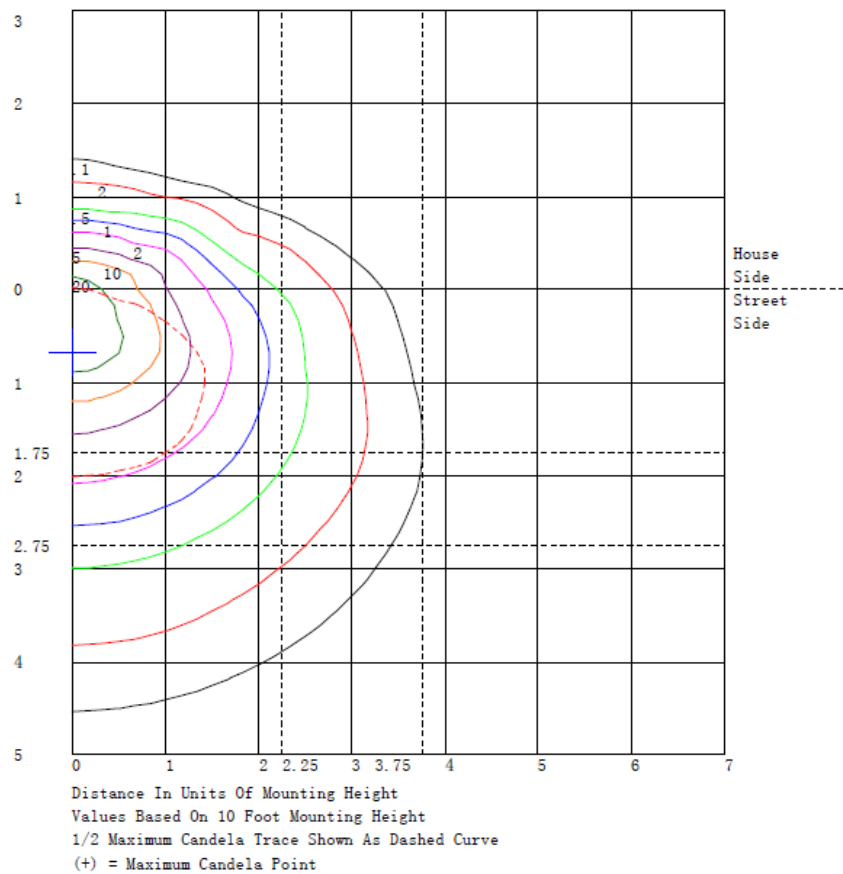
	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	1343.7	N.A.	16.3
FM - Front-Medium (30-60)	3740.3	N.A.	45.3
FH - Front-High (60-80)	1495.8	N.A.	18.1
FVH - Front-Very High (80-90)	223.5	N.A.	2.7
BL - Back-Low (0-30)	613.7	N.A.	7.4
BM - Back-Medium (30-60)	524.9	N.A.	6.4
BH - Back-High (60-80)	87.4	N.A.	1.1
BVH - Back-Very High (80-90)	9.6	N.A.	0.1
UL - Uplight-Low (90-100)	96.1	N.A.	1.2
UH - Uplight-High (100-180)	113.3	N.A.	1.4
Total	8248.3	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) y (DEG)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	2581	2581	2580	2580	2580	2581	2581	2582	2584	2585	2588	2590	2592	2594	2595	2596	2598	2600	2602
5	2599	2571	2566	2584	2656	2728	2777	2712	2628	2553	2567	2606	2655	2694	2727	2750	2744	2730	2712
10	2476	2530	2577	2614	2630	2647	2678	2759	2854	2956	3060	3149	3212	3200	3165	3122	3105	3095	3095
15	2405	2396	2426	2497	2645	2805	2951	2999	3020	3032	3080	3127	3164	3169	3162	3151	3147	3143	3140
20	2304	2364	2446	2550	2699	2854	2995	3073	3128	3169	3194	3227	3280	3420	3570	3704	3748	3761	3751
25	2138	2288	2430	2566	2693	2814	2931	3023	3127	3258	3481	3723	3962	4157	4316	4430	4448	4433	4404
30	1994	2253	2470	2645	2728	2808	2920	3206	3521	3823	3994	4129	4246	4409	4556	4673	4705	4705	4683
35	1772	2090	2367	2603	2760	2903	3062	3326	3615	3913	4205	4469	4686	4788	4840	4860	4882	4890	4887
40	1605	1936	2235	2501	2698	2891	3105	3458	3821	4156	4350	4493	4601	4720	4814	4877	4875	4852	4824
45	1457	1715	1988	2275	2590	2909	3222	3526	3796	4015	4121	4176	4199	4231	4249	4252	4228	4197	4170
50	1256	1447	1689	1981	2382	2790	3161	3374	3522	3617	3677	3712	3734	3781	3821	3846	3824	3793	3765
55	1071	1260	1487	1755	2108	2466	2793	3001	3149	3244	3284	3286	3263	3225	3182	3145	3145	3153	3162
60	856	1104	1351	1595	1855	2100	2318	2477	2599	2687	2726	2748	2768	2843	2916	2972	2955	2921	2888
65	722	956	1172	1368	1542	1701	1845	1994	2124	2225	2263	2276	2279	2301	2323	2345	2367	2385	2394
70	527	659	799	948	1122	1293	1450	1568	1659	1723	1743	1746	1743	1766	1789	1806	1799	1787	1777
75	388	444	519	613	749	888	1011	1067	1099	1115	1132	1146	1159	1184	1209	1232	1249	1260	1264
80	280	282	305	347	423	509	595	660	714	756	776	787	792	799	806	813	825	835	840
85	106	107	122	151	203	262	323	375	421	460	484	503	519	541	561	577	583	585	584
90	26.6	41.8	59.5	79.5	102	127	154	182	211	241	271	300	327	351	372	389	400	407	410
95	21.9	30.0	39.1	49.1	59.9	71.6	84.3	97.1	112	129	151	176	202	227	251	271	284	292	295
100	22.8	24.1	26.1	28.8	30.0	33.4	40.7	54.9	75.1	102	139	181	226	273	318	357	383	399	405
105	15.3	16.7	18.1	19.4	19.8	20.8	23.1	29.4	36.8	44.4	48.2	52.8	59.6	74.1	90.7	108	127	142	148
110	14.6	11.7	12.1	15.9	27.4	39.0	47.7	40.2	30.7	23.4	32.4	44.5	56.4	59.2	59.9	59.4	60.9	62.2	62.8
115	15.8	10.5	9.32	12.2	22.5	34.5	45.6	50.6	52.1	49.8	38.6	27.1	18.6	25.3	35.8	47.4	54.0	58.4	59.9
120	11.2	6.71	6.22	9.70	19.5	31.5	43.9	52.8	59.9	65.0	68.1	68.3	65.0	53.6	40.7	29.0	25.5	24.9	26.2
125	8.54	4.66	4.39	7.73	16.6	27.7	39.4	48.9	57.2	64.2	69.1	72.3	73.7	72.4	69.9	66.8	64.0	61.8	60.6
130	6.30	3.24	3.13	5.98	13.3	22.4	32.2	40.3	47.7	54.4	60.3	64.9	68.0	68.2	67.1	65.4	64.3	63.4	63.0
135	2.04	0.00	0.00	1.23	8.27	17.0	26.1	32.6	38.4	43.8	49.7	54.8	58.7	59.7	59.7	59.2	59.3	59.5	59.8
140	1.97	3.02	4.81	7.33	10.8	14.9	19.3	24.1	28.9	33.6	38.0	41.8	45.1	47.1	48.6	49.6	50.7	51.4	51.9
145	1.82	2.13	3.08	4.67	7.07	9.99	13.3	17.0	20.8	24.3	27.2	29.8	32.0	33.9	35.5	36.9	38.5	39.8	40.7
150	1.30	1.25	1.22	1.18	0.39	0.17	1.11	5.81	11.3	16.6	19.2	20.9	22.1	23.4	24.5	25.5	26.6	27.4	28.0
155	1.42	1.26	1.31	1.58	2.05	2.75	3.69	4.96	6.47	8.21	10.4	12.6	14.6	15.7	16.5	17.0	17.7	18.3	18.7
160	1.57	1.48	1.46	1.50	1.72	1.93	2.07	1.69	1.36	1.30	2.11	3.31	4.82	6.79	8.73	10.4	11.0	11.3	11.2
165	1.68	1.69	1.68	1.67	1.61	1.58	1.59	1.73	1.95	2.27	2.90	3.46	3.76	3.10	2.25	1.42	1.26	1.28	1.40
170	1.81	1.82	1.83	1.82	1.82	1.81	1.79	1.75	1.70	1.66	1.62	1.61	1.63	1.77	1.92	2.06	2.06	2.04	2.02
175	1.91	1.93	1.94	1.94	1.94	1.93	1.91	1.91	1.91	1.90	1.89	1.87	1.86	1.83	1.80	1.78	1.73	1.70	1.69
180	2.21	2.22	2.23	2.22	2.21	2.20	2.18	2.17	2.16	2.14	2.11	2.07	2.04	2.00	1.97	1.93	1.89	1.85	1.83

UNIT: cd																			
C (DEG) y	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	2600	2598	2596	2595	2594	2592	2590	2588	2585	2584	2582	2581	2581	2580	2580	2580	2581	2581	2597
5	2730	2744	2750	2727	2694	2656	2606	2567	2553	2628	2712	2777	2728	2656	2584	2566	2571	2599	2534
10	3095	3105	3122	3165	3200	3212	3149	3060	2956	2854	2759	2678	2647	2630	2614	2577	2530	2476	2384
15	3143	3147	3151	3162	3169	3164	3127	3080	3032	3020	2999	2951	2805	2645	2497	2426	2396	2405	2231
20	3761	3748	3704	3570	3420	3280	3227	3194	3169	3128	3073	2995	2854	2699	2550	2446	2364	2304	2088
25	4433	4448	4430	4316	4157	3962	3723	3481	3258	3127	3023	2931	2814	2693	2566	2430	2288	2138	2038
30	4705	4705	4673	4556	4409	4246	4129	3994	3823	3521	3206	2920	2808	2728	2645	2470	2253	1994	1968
35	4890	4882	4860	4840	4788	4686	4469	4205	3913	3615	3326	3062	2903	2760	2603	2367	2090	1772	1818
40	4852	4875	4877	4814	4720	4601	4493	4350	4156	3821	3458	3105	2891	2698	2501	2235	1936	1605	1585
45	4197	4228	4252	4249	4231	4199	4176	4121	4015	3796	3526	3222	2909	2590	2275	1988	1715	1457	1393
50	3793	3824	3846	3821	3781	3734	3712	3677	3617	3522	3374	3161	2790	2382	1981	1689	1447	1256	1115
55	3153	3145	3145	3182	3225	3263	3286	3284	3244	3149	3001	2793	2466	2108	1755	1487	1260	1071	866
60	2921	2955	2972	2916	2843	2768	2748	2726	2687	2599	2477	2318	2100	1855	1595	1351	1104	856	637
65	2385	2367	2345	2323	2301	2279	2276	2263	2225	2124	1994	1845	1701	1542	1368	1172	956	722	531
70	1787	1799	1806	1789	1766	1743	1746	1743	1723	1659	1568	1450	1293	1122	948	799	659	527	395
75	1260	1249	1232	1209	1184	1159	1146	1132	1115	1099	1067	1011	888	749	613	519	444	388	278
80	835	825	813	806	799	792	787	776	756	714	660	595	509	423	347	305	282	280	190
85	585	583	577	561	541	519	503	484	460	421	375	323	262	203	151	122	107	106	76.7
90	407	400	389	372	351	327	300	271	241	211	182	154	127	102	79.5	59.5	41.8	26.6	24.6
95	292	284	271	251	227	202	176	151	129	112	97.1	84.3	71.6	59.9	49.1	39.1	30.0	21.9	18.8
100	399	383	357	318	273	226	181	139	102	75.1	54.9	40.7	33.4	30.0	28.8	26.1	24.1	22.8	18.1
105	142	127	108	90.7	74.1	59.6	52.8	48.2	44.4	36.8	29.4	23.1	20.8	19.8	19.4	18.1	16.7	15.3	11.8
110	62.2	60.9	59.4	59.9	59.2	56.4	44.5	32.4	23.4	30.7	40.2	47.7	39.0	27.4	15.9	12.1	11.7	14.6	11.4
115	58.4	54.0	47.4	35.8	25.3	18.6	27.1	38.6	49.8	52.1	50.6	45.6	34.5	22.5	12.2	9.32	10.5	15.8	11.5
120	24.9	25.5	29.0	40.7	53.6	65.0	68.3	68.1	65.0	59.9	52.8	43.9	31.5	19.5	9.70	6.22	6.71	11.2	8.58
125	61.8	64.0	66.8	69.9	72.4	73.7	72.3	69.1	64.2	57.2	48.9	39.4	27.7	16.6	7.73	4.39	4.66	8.54	6.72
130	63.4	64.3	65.4	67.1	68.2	68.0	64.9	60.3	54.4	47.7	40.3	32.2	22.4	13.3	5.98	3.13	3.24	6.30	5.14
135	59.5	59.3	59.2	59.7	59.7	58.7	54.8	49.7	43.8	38.4	32.6	26.1	17.0	8.27	1				
140	51.4	50.7	49.6	48.6	47.1	45.1	41.8	38.0	33.6	28.9	24.1	19.3	14.9	10.8	7.23	4.81	3.02	1.94	2.26
145	39.8	38.5	36.9	35.5	33.9	32.0	29.8	27.2	24.3	20.8	17.0	13.3	9.99	7.07	4.67	3.08	2.13	1.82	2.11
150	27.4	26.6	25.5	24.5	23.4	22.1	20.2	19.2	16.6	11.3	5.81	1.11	0.17	0.39	1.18	1.22	1.25	1.30	1.83
155	18.3	17.7	17.0	16.5	15.7	14.6	12.6	10.4	8.21	6.47	4.96	3.69	2.75	2.05	1.58	1.31	1.26	1.42	2.05
160	11.3	11.0	10.4	8.73	6.79	4.82	3.31	2.11	1.30	1.36	1.69	2.07	1.93	1.72	1.50	1.46	1.48	1.57	2.25
165	1.28	1.26	1.46	2.25	3.10	3.76	3.46	2.90	2.37	1.95	1.73	1.59	1.58	1.61	1.67	1.68	1.69	1.68	2.34
170	2.04	2.06	2.02	1.92	1.77	1.63	1.61	1.62	1.66	1.70	1.75	1.79	1.81	1.82	1.82	1.83	1.82	1.81	2.33
175	1.70	1.73	1.78	1.80	1.83	1.86	1.87	1.89	1.90	1.91	1.91	1.91	1.93	1.94	1.94	1.94	1.93	1.91	2.24
180	1.85	1.89	1.93	1.97	2.00	2.04	2.07	2.11	2.14	2.16	2.17	2.18	2.20	2.21	2.22	2.23	2.22	2.21	2.24

Table--3

UNIT: °C

C (DEG)	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
0	2610	2618	2620	2619	2616	2615	2614	2612	2611	2610	2609	2608	2607	2606	2605	2604	2602	2604	2605
5	2478	2431	2401	2373	2339	2265	2190	2126	2116	2121	2131	2126	2116	2100	2063	2027	2001	2027	2063
10	2297	2217	2135	2064	2010	1996	1997	2005	2009	2008	1996	1945	1891	1851	1877	1914	1947	1914	1877
15	2094	1993	1938	1912	1906	1920	1932	1926	1850	1757	1662	1596	1544	1506	1491	1487	1489	1487	1491
20	1931	1831	1835	1862	1878	1781	1653	1510	1383	1259	1139	1021	917	831	780	752	743	752	780
25	1936	1832	1737	1633	1512	1339	1157	979	834	712	617	570	547	539	528	522	521	522	528
30	1897	1781	1598	1387	1164	947	750	590	525	497	487	455	426	403	387	378	375	378	387
35	1782	1664	1403	1106	819	664	554	476	410	361	324	289	261	240	226	217	214	217	226
40	1503	1360	1097	815	557	448	384	346	285	231	187	159	140	129	122	119	119	119	122
45	1282	1134	903	662	443	335	266	223	178	145	122	111	106	105	101	98.4	97.2	98.4	101
50	970	820	651	489	345	254	188	144	116	101	92.7	82.6	75.4	70.6	67.9	66.8	66.9	66.8	67.9
55	688	537	417	320	244	182	136	102	79.8	66.0	58.2	52.5	49.6	48.5	47.2	46.7	46.7	46.7	47.2
60	460	322	240	188	154	116	85.4	62.5	48.1	39.1	33.8	29.0	25.7	23.6	21.7	20.5	20.1	20.5	21.7
65	375	253	176	125	93.2	64.8	44.9	31.0	17.7	7.92	1.46	0.00	0.00	0.76	0.79	0.88	1.01	0.88	0.79
70	284	194	132	86.8	55.9	32.2	16.8	7.77	2.54	0.63	0.76	0.35	0.48	0.90	1.02	1.15	1.30	1.15	1.02
75	188	118	73.6	44.7	27.5	14.8	7.80	4.76	2.13	1.05	0.95	0.70	0.77	1.01	1.18	1.37	1.58	1.37	1.18
80	119	65.7	37.1	22.0	15.7	8.78	4.97	3.32	1.86	1.24	1.16	1.00	1.03	1.18	1.37	1.60	1.82	1.60	1.37
85	52.6	33.8	22.1	14.5	9.95	6.13	3.76	2.48	1.67	1.37	1.38	1.29	1.30	1.38	1.53	1.71	1.89	1.71	1.53
90	22.1	19.1	14.9	10.8	6.95	4.71	3.18	2.23	1.74	1.58	1.62	1.58	1.59	1.65	1.73	1.84	1.96	1.84	1.73
95	15.9	13.2	10.4	7.87	5.69	4.17	3.06	2.32	1.97	1.85	1.88	1.86	1.87	1.92	1.96	2.03	2.13	2.03	1.96
100	14.1	10.7	8.07	6.00	4.48	3.57	3.05	2.81	2.62	2.54	2.52	2.45	2.39	2.37	2.37	2.42	2.52	2.42	2.37
105	8.79	6.33	4.37	2.94	2.03	1.89	2.10	2.48	2.58	2.66	2.71	2.69	2.67	2.65	2.67	2.73	2.82	2.73	2.67
110	8.69	6.51	4.97	3.87	3.14	2.64	2.36	2.26	2.27	2.36	2.49	2.61	2.73	2.82	2.83	2.82	2.82	2.82	2.83
115	8.07	5.47	3.96	3.10	2.69	2.36	2.24	2.24	2.28	2.37	2.47	2.51	2.53	2.56	2.59	2.63	2.67	2.63	2.59
120	6.44	4.75	3.59	2.80	2.33	2.12	2.09	2.19	2.27	2.38	2.49	2.55	2.60	2.64	2.69	2.73	2.77	2.73	2.69
125	5.22	4.01	3.16	2.58	2.24	2.10	2.12	2.23	2.35	2.48	2.62	2.69	2.74	2.78	2.86	2.92	2.96	2.92	2.86
130	4.16	3.38	2.79	2.38	2.13	2.09	2.17	2.30	2.41	2.54	2.66	2.78	2.88	2.98	3.08	3.17	3.23	3.17	3.08
135	2.89	3.01	2.77	2.45	2.14	2.15	2.25	2.40	2.53	2.65	2.78	2.88	2.97	3.05	3.13	3.19	3.23	3.19	3.13
140	2.54	2.65	2.57	2.42	2.29	2.33	2.42	2.53	2.62	2.71	2.80	2.90	2.99	3.08	3.17	3.24	3.30	3.24	3.17
145	2.34	2.49	2.53	2.52	2.51	2.56	2.62	2.69	2.79	2.89	2.98	3.02	3.06	3.11	3.19	3.28	3.35	3.28	3.19
150	2.24	2.53	2.66	2.70	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.04	3.08	3.12	3.19	3.26	3.31	3.26	3.19
155	2.52	2.85	2.99	3.02	2.98	2.95	2.91	2.88	2.89	2.92	2.96	3.02	3.07	3.11	3.12	3.12	3.12	3.12	3.12
160	2.76	3.11	3.23	3.23	3.15	3.09	3.03	2.97	2.97	2.98	2.99	2.96	2.93	2.90	2.91	2.93	2.95	2.93	2.91
165	2.84	3.16	3.24	3.20	3.09	3.03	2.96	2.89	2.83	2.77	2.71	2.65	2.59	2.56	2.58	2.61	2.64	2.61	2.58
170	2.70	2.93	2.95	2.87	2.72	2.57	2.43	2.31	2.28	2.29	2.31	2.29	2.27	2.25	2.24	2.24	2.25	2.24	2.24
175	2.48	2.63	2.67	2.65	2.56	2.43	2.30	2.17	2.15	2.15	2.16	2.09	2.03	1.98	2.01	2.06	2.11	2.06	2.01
180	2.19	2.18	2.17	2.16	2.15	2.11	2.07	2.03	1.98	1.94	1.90	1.87	1.85	1.85	1.87	1.90	1.93	1.90	1.87

C (DEG)	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355				
0	2606	2607	2608	2609	2610	2611	2612	2614	2615	2616	2619	2620	2618	2610	2597				
5	2100	2116	2126	2131	2121	2116	2126	2190	2265	2339	2373	2401	2431	2478	2534				
10	1851	1891	1945	1996	2008	2009	2005	1997	1996	2010	2064	2135	2217	2297	2384				
15	1506	1544	1596	1662	1757	1850	1926	1932	1920	1906	1912	1938	1993	2094	2231				
20	831	917	1021	1139	1259	1383	1510	1653	1781	1878	1862	1835	1831	1931	2088				
25	539	547	570	617	712	834	979	1157	1339	1512	1633	1737	1832	1936	2038				
30	403	426	455	487	497	525	590	750	947	1164	1387	1598	1781	1897	1968				
35	240	261	289	324	361	410	476	554	664	819	1106	1403	1664	1782	1818				
40	129	140	159	187	231	285	346	384	448	557	815	1097	1360	1503	1585				
45	105	106	111	122	145	178	223	266	335	443	662	903	1134	1282	1390				
50	70.6	75.4	82.6	92.7	101	116	144	188	254	345	489	651	820	970	1115				
55	48.5	49.6	52.5	58.2	66.0	79.8	102	136	182	244	320	417	537	688	866				
60	23.6	25.7	29.0	33.8	39.1	48.1	62.5	85.4	116	154	188	240	322	460	637				
65	0.76	0.00	0.00	1.46	7.92	17.7	31.0	44.9	64.8	93.2	125	176	253	375	531				
70	0.90	0.48	0.35	0.76	0.63	2.54	7.77	16.8	32.2	55.9	86.8	132	194	284	395				
75	1.01	0.77	0.70	0.95	1.05	2.13	4.76	7.80	14.8	27.5	44.7	73.6	118	188	278				
80	1.18	1.03	1.00	1.16	1.24	1.86	3.32	4.97	8.78	15.7	22.0	37.1	65.7	119	190				
85	1.38	1.30	1.29	1.38	1.37	1.67	2.48	3.76	6.13	9.95	14.5	22.1	33.8	52.6	76.7				
90	1.65	1.59	1.58	1.62	1.58	1.74	2.23	3.18	4.71	6.95	10.8	14.9	19.1	22.1	24.6				
95	1.92	1.87	1.86	1.88	1.85	1.97	2.32	3.06	4.17	5.69	7.87	10.4	13.2	15.9	18.8				
100	2.37	2.39	2.45	2.52	2.54	2.62	2.81	3.05	3.57	4.48	6.00	8.07	10.7	14.1	18.1				
105	2.65	2.67	2.69	2.71	2.66	2.58	2.48	2.10	1.89	2.03	2.94	4.37	6.33	8.79	11.8				
110	2.82	2.73	2.61	2.49	2.36	2.27	2.26	2.36	2.64	3.14	3.87	4.97	6.51	8.69	11.4				
115	2.56	2.53	2.51	2.47	2.37	2.28	2.24	2.24	2.36	2.69	3.10	3.96	5.47	8.07	11.5				
120	2.64	2.60	2.55	2.49	2.38	2.27	2.19	2.09	2.12	2.33	2.80	3.59	4.75	6.44	8.58				
125	2.78	2.74	2.69	2.62	2.48	2.35	2.23	2.12	2.10	2.24	2.58	3.16	4.01	5.22	6.72				
130	2.98	2.88	2.78	2.66	2.54	2.41	2.30	2.17	2.09	2.13	2.38	2.79	3.38	4.16	5.14				
135	3.05	2.97	2.88	2.78	2.65	2.53	2.40	2.25	2.15	2.14	2.45	2.77	3.01	2.89	2.56				
140	3.08	2.99	2.90	2.80	2.71	2.62	2.53	2.42	2.33	2.29	2.42	2.57	2.65	2.54	2.31				
145	3.11	3.06	3.02	2.98	2.89	2.79	2.69	2.62	2.56	2.51	2.52	2.53	2.49	2.34	2.11				
150	3.12	3.08	3.04	3.00	2.95	2.90	2.85	2.80	2.75	2.70	2.70	2.66	2.53	2.24	1.83				
155	3.11	3.07	3.02	2.96	2.92	2.89	2.88	2.91	2.95	2.98	3.02	2.99	2.85	2.52	2.05				
160	2.90	2.93	2.96	2.99	2.98	2.97	2.97	3.03	3.09	3.15	3.23	3.23	3.11	2.76	2.25				
165	2.56	2.59	2.65	2.71	2.77	2.83	2.89	2.96	3.03	3.09	3.20	3.24	3.16	2.84	2.34				
170	2.25	2.27	2.29	2.31	2.29	2.28	2.31	2.43	2.57	2.72	2.87	2.95	2.93	2.70	2.33				
175	1.98	2.03	2.09	2.16	2.15	2.15	2.17	2.30	2.43	2.56	2.65	2.67	2.63	2.48	2.24				
180	1.85	1.85	1.87	1.90	1.94	1.98	2.03	2.07	2.11	2.15	2.16	2.17	2.18	2.19	2.20				

4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	WPX2 @ 60W / 3000K 480	Sample ID	231101004-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(%)
480.0	60	0.143	59.2	0.864	10.08

5.0 Equipment List:

Equipment ID	Equipment Name	Last Cal.	Due Cal.
NTC-F01-001	Goniophotometer System	2023-11-08	2024-11-07
NTC-F01-006	2.0 meter Integrating Sphere	2023-11-08	2024-11-07
NTC-F01-012	Standard Lamp	2023-11-02	2024-11-01
NTC-F01-013	Standard Lamp	2023-11-02	2024-11-01
NTC-F01-031	Digital Power Meter	2023-08-25	2024-08-24
NTC-F01-019	Temperature & Humidity Meter	2023-11-06	2024-11-05

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